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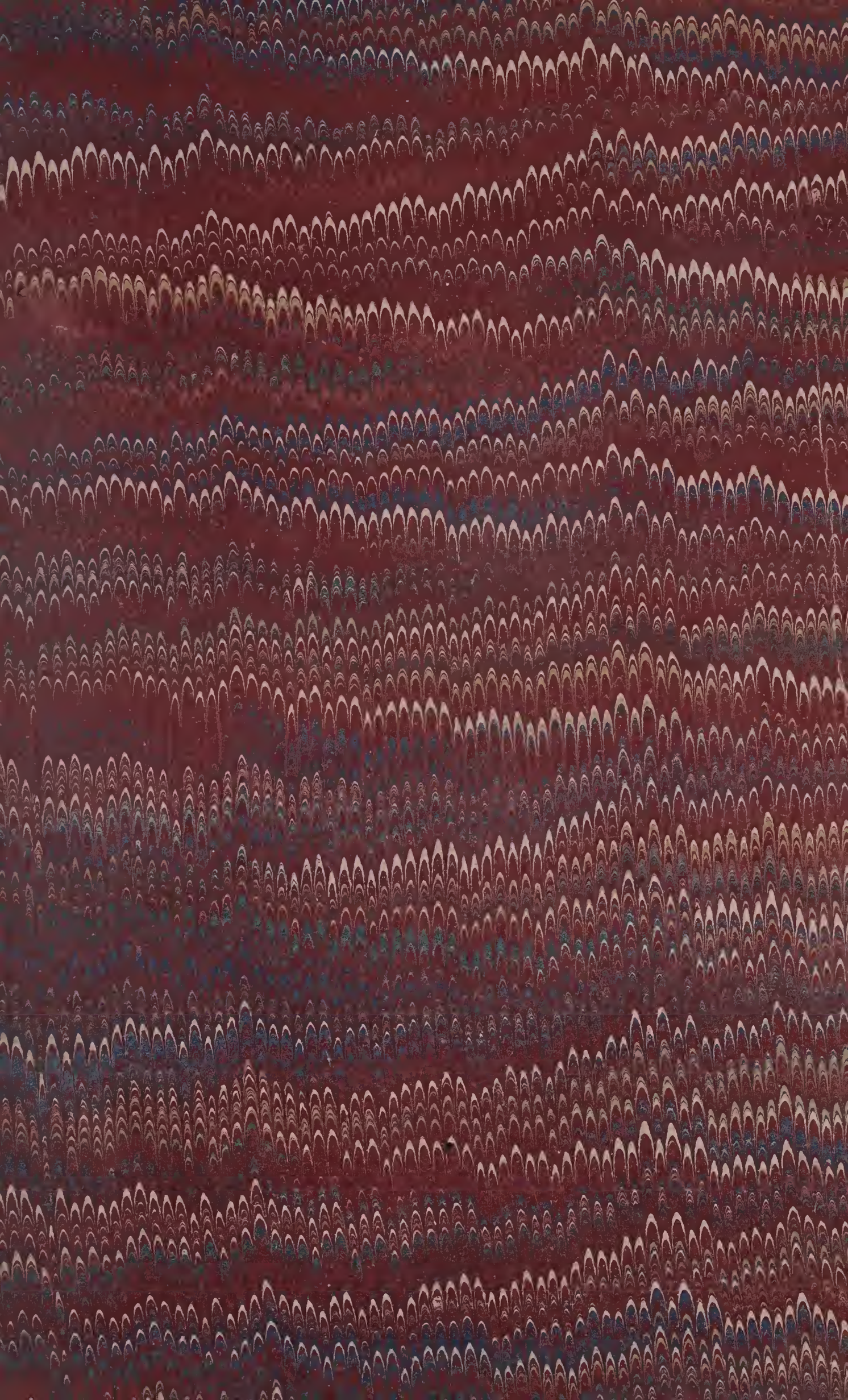

MANUAL

FOR THE USE OF

PROSPECTORS

ON THE

MINERAL LANDS

OF THE

UNITED STATES.

BY HENRY N. COPP.

PUBLISHED BY THE EDITOR.
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UNITED STATES

MINING LAWS*

AND

REGULATIONS THEREUNDER

Reserved from Sale under the Pre-emption and Homestead Laws.

UNITED STATES LAW.—SEC. 386. In all cases lands valuable for minerals shall be reserved from sale, except as otherwise expressly directed by law.

License to Explore, Occupy, and Purchase.

SEC. 387. All valuable mineral deposits in lands belonging to the United States, both surveyed and unsurveyed, are hereby declared to be free and open to exploration and purchase, and the lands in which they are found to occupation and purchase, by citizens of the United States and those who have declared their intention to become such, under regulations prescribed by law, and according to the local customs and rules of miners in the several mining districts, so far as the same are applicable and not inconsistent with the laws of the United States.

Lode Claims.

SEC. 388. Mining claims upon veins or lodes of quartz or other rock in place, bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposits heretofore located, shall be governed as to length along the vein or lode by the customs, regulations, and laws in force at the date of their location. A mining claim located after the tenth day of May, eighteen hundred and seventy-two, whether located by one or more persons, may equal, but shall not exceed, one thousand five hundred feet in length along the vein or lode; but no location of a mining claim shall be made until the discovery of the vein or lode within the limits of the claim located. No claim shall extend more than three hundred feet on each side of the middle of the vein at the surface, nor shall any claim be limited by any mining regulation to less than twenty-

* These laws are the codification of the Public Land Commission, except as otherwise indicated.

five feet on each side of the middle of the vein at the surface, except where adverse rights existing on the tenth day of May, eighteen hundred and seventy-two, render such limitation necessary. The end lines of each claim shall be parallel to each other.

SEC. 390. The locators of all mining locations heretofore made or which shall hereafter be made, on any mineral vein, lode, or ledge, situated on the public domain, their heirs and assigns, where no adverse claim exists on the tenth day of May, eighteen hundred and seventy-two, so long as they comply with the laws of the United States, and with state, territorial, and local regulations not in conflict with the laws of the United States governing their possessory title, shall have the exclusive right of possession and enjoyment of all the surface included within the lines of their locations, and of all veins, lodes, and ledges throughout their entire depth, the top or apex of which lies inside of such surface lines extended downward vertically, although such veins, lodes, or ledges may so far depart from a perpendicular in their course downward as to extend outside the vertical side lines of such surface locations. But their right of possession to such outside parts of such veins or ledges shall be confined to such portions thereof as lie between vertical planes drawn downward as above described, through the end lines of their locations, so continued in their own direction that such planes will intersect such exterior parts of such veins or ledges. And nothing in this section shall authorize the locator or possessor of a vein or lode which extends in its downward course beyond the vertical lines of his claim to enter upon the surface of a claim owned or possessed by another. No possessory action between individuals, in any court of the United States, for the recovery of any mining title, or for damages to any such title, shall be affected by the fact that the paramount title to the land on which such mines are, is in the United States, but each case shall be adjudged by the law of possession.

Status of Lode-Claims Located Prior to May 10, 1872.

LAND OFFICE REGULATIONS.—2. By an examination of the several sections of the Revised Statutes, it will be seen that the *status* of lode-claims located *previous* to the 10th of May, 1872, is not changed with regard to their *extent along the lode or width of surface.*

3. Mining rights acquired under such previous locations are, however, enlarged by said Revised Statutes in the following respect, viz.: The locators of all such previously taken veins or lodes, their heirs and assigns, so long as they comply with the laws of Congress and with State, Territorial, or local regulations not in conflict therewith, governing mining claims, are invested with the exclusive possessory right of all the surface included within the lines of their locations, and of all veins, lodes, or ledges throughout their entire depth, the top or apex of which lies inside of such surface-lines extended downward vertically, although such veins, lodes, or ledges may so far depart from a perpendicular in their course downward as to extend outside the vertical side-lines of such locations at the surface; it being expressly provided, however, that the right of possession to such outside parts of said veins or ledges shall be confined to such portions thereof as lie between vertical planes drawn downward as aforesaid, through the end-lines of their locations so continued in their own direction that such planes will intersect such exterior parts of such veins, lodes, or ledges; no right being granted, however, to the claimant of such outside portion of a vein or ledge to enter upon the surface location of another claimant.

4. It is to be distinctly understood, however, that the law limits the possessory right to veins, lodes, or ledges, *other* than the one named in the original location, to such as were not *adversely claimed on May 10, 1872*, and that where such other vein or ledge was so adversely claimed at that date, the right of the party so adversely claiming is in no way impaired by the provisions of the Revised Statutes.

5. In order to hold the possessory title to a mining claim located prior to May 10, 1872, and for which a patent has not been issued, the law requires that *ten dollars* shall be expended annually in labor or improvements on each claim of *one hundred feet* on the course of the vein or lode until a patent shall have been issued therefor; but where a number of such claims are held in common upon the same vein or lode, the aggregate expenditure that would be necessary to hold all the claims, at the rate of ten dollars per hundred feet, may be made upon any one claim; a failure to comply with this requirement in any one year subjecting the claim upon which such failure occurred to relocation by other parties, the same as if no previous location thereof had ever been made, unless the claimants under the original location shall have resumed work thereon after such failure and before such relocation. The first annual expenditure upon claims of this class should have been performed subsequent to May 10, 1872, and prior to January 1, 1875. From and after January 1, 1875, the required amount must be expended *annually* until patent issues. By decision of the honorable Secretary of the Interior, dated March 4, 1879, such annual expenditures are not required subsequent to entry, the date of issuing the patent certificate being the date contemplated by statute.

6. Upon the failure of any one of several co-owners of a vein, lode, or ledge, which has not been entered, to contribute his proportion of the expenditures necessary to hold the claim or claims so held in ownership in common, the co-owners who have performed the labor, or made the improvements, as required by said Revised Statutes, may, at the expiration of the year, give such delinquent co-owner personal notice in writing, or notice by publication in the newspaper published nearest the claim, for at least once a week for ninety days; and if upon the expiration of ninety days after such notice in writing, or upon the expiration of one hundred and eighty days after the first newspaper publication of notice, the delinquent co-owner shall have failed to contribute his proportion to meet such expenditure or improvements, his interest in the claim by law passes to his co-owners, who have made the expenditures or improvements as aforesaid.

District Rules, Locations, and Annual Expenditures.

UNITED STATES LAW.—SEC. 392. The miners of each mining district may make regulations not in conflict with the laws of the United States, or with the laws of the state or territory in which the district is situated, governing the location, manner of recording, amount of work necessary to hold possession of a mining claim, subject to the following requirements: The location must be distinctly marked on the ground, so that its boundaries can be readily traced. All records of mining claims hereafter made shall contain the name or names of the locators, the date of the locations, and such a description of the claim or claims located by reference to some natural object or permanent monument as will identify the claim. On each claim located after the tenth day of May, eighteen hundred and seventy-two, and until a patent has been issued therefor, not less than one hundred dollars' worth of labor shall be performed or improvements made during each year: *Provided*, That the period within which the work required to be done annually on all unpatented claims, so located, shall commence on the first day of Janu-

ary succeeding the date of location of such claim. On all claims located prior to the tenth day of May, eighteen hundred and seventy-two, ten dollars worth of labor shall be performed or improvements made by the first day of January, eighteen hundred and seventy-five, and each year thereafter, for each one hundred feet in length along the vein, until a patent has been issued therefor; but where such claims are held in common, such expenditure may be made upon any one claim; and where a person or company has or may run a tunnel for the purposes of developing a lode or lodes, owned by said person or company, the money so expended in said tunnel shall be taken and considered as expended on said lode or lodes, whether located prior to or since the tenth day of May, eighteen hundred and seventy-two, and such person or company shall not be required to perform work on the surface of said lode or lodes in order to hold the same as required by said act. Upon a failure to comply with the foregoing conditions of annual expenditure, the claim or mine upon which such failure occurred shall be open to relocation in the same manner as if no location of the same had ever been made: *Provided*, That the original locators, their heirs, assigns, or legal representatives, have not resumed work upon the claim after failure and before such location. Upon the failure of any one of several co-owners to contribute his proportion of the expenditures required hereby, the co-owners who have performed the labor or made the improvements may, at the expiration of the year, give such delinquent co-owner personal notice in writing or notice by publication in the newspaper published nearest the claim, for at least once a week for ninety days, and if at the expiration of ninety days after such notice in writing or by publication such delinquent should fail or refuse to contribute his proportion of the expenditure required by this section, his interest in the claim shall become the property of his co-owners, who have made the required expenditures. [See paragraph 6, p. 3.]

How to Locate Claims on Veins or Lodes.

LAND OFFICE REGULATIONS.—9. From and after the 10th of May, 1872, any person who is a citizen of the United States or who has declared his intention to become a citizen, may locate, record, and hold a mining claim of *fifteen hundred linear feet* along the course of any mineral vein or lode subject to location; or an association of persons, severally qualified as above, may make a joint location of such claim of *fifteen hundred feet*, but in no event can a location of a vein or lode made subsequent to May 10, 1872, exceed fifteen hundred feet along the course thereof, whatever may be the number of persons composing the association.

10. With regard to the extent of surface-ground adjoining a vein or lode, and claimed for the convenient working thereof, the Revised Statutes provide that the lateral extent of locations of veins or lodes made after May 10, 1872, shall in no case *exceed three hundred feet on each side of the middle of the vein at the surface*, and that no such surface-rights shall be limited by any mining regulations to less than twenty-five feet on each side of the middle of the vein at the surface, except where adverse rights existing on the 10th of May, 1872, may render such limitation necessary; the end-lines of such claims to be in all cases parallel to each other. Said lateral measurements cannot extend beyond three hundred feet on *either* side of the middle of the vein at the surface, or such distance as is allowed by local laws. For example: 400 feet cannot be taken on one side and 200 feet on the other. If, however, 300 feet

on each side are allowed, and by reason of prior claims but 100 feet can be taken on one side, the locator will not be restricted to less than 300 feet on the other side; and when the locator does not determine by exploration *where* the middle of the vein at the surface is, his discovery-shaft must be assumed to mark such point.

11. By the foregoing it will be perceived that no lode-claim located after the 10th of May, 1872, can exceed a parellelogram fifteen hundred feet in length by six hundred feet in width; but whether surface-ground of that width can be taken, depends upon the local regulations or State or Territorial laws in force in the several mining districts; and that no such local regulations or State or Territorial laws shall limit a vein or lode claim to less than fifteen hundred feet along the course thereof, whether the location is made by one or more persons, nor can surface-rights be limited to less than fifty feet in width, unless adverse claims existing on the 10th day of May, 1872, render such lateral limitation necessary.

12. It is provided by the Revised Statutes that the miners of each district may make rules and regulations not in conflict with the laws of the United States, or of the State or Territory in which such districts are respectively situated, governing the location, manner of recording, and amount of work necessary to hold possession of a claim. They likewise require that the location shall be so distinctly marked on the ground that its boundaries may be readily traced. This is a very important matter, and locators cannot exercise too much care in defining their locations at the outset, inasmuch as the law requires that all records of mining locations made subsequent to May 10, 1872, shall contain the name or names of the locators, the date of the location, and such a *description of the claim or claims* located, by reference to some natural object or permanent monument, as will identify the claim.

13. The statutes provide that no lode-claim shall be recorded until after the discovery of a vein or lode within the limits of the ground claimed; the object of which provision is evidently to prevent the encumbering of the district mining records with useless locations, before sufficient work has been done thereon to determine whether a vein or lode has really been discovered or not.

14. The claimant should therefore, prior to recording his claim, unless the vein can be traced upon the surface, sink a shaft, or run a tunnel or drift, to a sufficient depth therein to discover and develop a mineral-bearing vein, lode, or crevice; should determine, if possible, the general course of such vein in either direction from the point of discovery, by which direction he will be governed in marking the boundaries of his claim on the surface, and should give the course and distance as nearly as practicable from the discovery-shaft on the claim to some permanent, well-known points or objects, such, for instance, as stone monuments, blazed trees, the confluence of streams, points of intersection of well-known gulches, ravines, or roads, prominent buttes, hills, etc., which may be in the immediate vicinity, and which will serve to perpetuate and fix the *locus* of the claim, and render it susceptible of identification from the description thereof given in the record of locations in the district.

15. In addition to the foregoing data, the claimant should state the names of adjoining claims, or, if none adjoin, the relative positions of the nearest claims; should drive a post or erect a monument of stones at each corner of his surface-ground, and at the point of discovery or discovery-shaft should fix a post, stake, or board, upon which should be designated the name of the lode, the name or names of the locators, the number of feet claimed, and in which direction from the point of discovery; it being essential that the location notice filed for record, in addition to the foregoing description, should state whether the entire claim of fifteen hundred feet is taken on one side of the point of discovery, or whether it is partly upon one and partly upon the other

side thereof, and in the latter case, how many feet are claimed upon each side of such discovery-point.

16. Within a reasonable time, say twenty days after the location shall have been marked on the ground, or such time as is allowed by the local laws, notice thereof, accurately describing the claim in manner aforesaid, should be filed for record with the proper recorder of the district, who will thereupon issue the usual certificate of location.

17. In order to hold the possessory right to a location made since May 10, 1872, not less than one hundred dollars' worth of labor must be performed, or improvements made thereon, within one year from the date of such location, and annually thereafter; in default of which the claim will be subject to relocation by any other party having the necessary qualifications, unless the original locator, his heirs, assigns, or legal representatives, have resumed work thereon after such failure and before such relocation.

18. The expenditures required upon mining claims may be made from the surface or in running a tunnel for the development of such claims, the act of February 11, 1875 providing that where a person or company has, or may, run a tunnel for the purpose of developing a lode or lodes owned by said person or company, the money so expended in said tunnel shall be taken and considered as expended on said lode or lodes, and such person or company shall not be required to perform work on the surface of said lode or lodes in order to hold the same.

19. The importance of attending to these details in the matter of location, labor, and expenditure, will be the more readily perceived when it is understood that a failure to give the subject proper attention may invalidate the claim.

Cross Lodes.

UNITED STATES LAW.—SEC. 404. Where two or more veins intersect or cross each other, priority of title shall govern, and such prior location shall be entitled to all ore or mineral contained within the space of intersection; but the subsequent location shall have the right of way through the space of intersection for the purposes of the convenient working of the mine. And where two or more veins unite, the oldest or prior location shall take the vein below the point of union, including all the space of intersection.

Tunnel Rights.

UNITED STATES LAW.—SEC. 391. Where a tunnel is run for the development of a vein or lode, or for the discovery of mines, the owners of such tunnel shall have the right of possession of all veins or lodes within three thousand feet from the face of such tunnel on the line thereof, not previously known to exist, discovered in such tunnel, to the same extent as if discovered from the surface: and locations on the line of such tunnel of veins or lodes, not appearing on the surface, made by other parties after the commencement of the tunnel, and while the same is being prosecuted with reasonable diligence, shall be invalid; but failure to prosecute the work on the tunnel for six months shall be considered as an abandonment of the right to all undiscovered veins on the line of such tunnel.

LAND OFFICE REGULATIONS.—20. Section 2323 [391], provides that where a tunnel is run for the development of a vein or lode, or for the discovery of mines, the owners of such tunnel shall have the right of possession of all veins or lodes within three

thousand feet from the face of such tunnel on the line thereof, not previously known to exist, discovered in such tunnel, to the same extent as if discovered from the surface; and locations on the line of such tunnel, or veins or lodes not appearing on the surface, made by other parties after the commencement of the tunnel, and while the same is being prosecuted with reasonable diligence, shall be invalid; but failure to prosecute the work on the tunnel for six months shall be considered as an abandonment of the right to all undiscovered veins or lodes on the line of said tunnel.

21. The effect of this is simply to give the proprietors of a mining tunnel run in good faith the possessory right to fifteen hundred feet of any blind lodes cut, discovered, or intersected by such tunnel, which were not previously known to exist, within three thousand feet from the face or point of commencement of such tunnel, and to prohibit other parties, after the commencement of the tunnel, from prospecting for and making locations of lodes on the *line thereof* and within said distance of three thousand feet, unless such lodes appear upon the surface or were previously known to exist.

22. The term "face," as used in said section, is construed and held to mean the first working face formed in the tunnel, and to signify the point at which the tunnel actually enters cover; it being from this point that the three thousand feet are to be counted, upon which prospecting is prohibited as aforesaid.

23. To avail themselves of the benefits of this provision of law, the proprietors of a mining tunnel will be required, at the time they enter cover as aforesaid, to give proper notice of their tunnel location, by erecting a substantial post, board, or monument at the face or point of commencement thereof, upon which should be posted a good and sufficient notice, giving the names of the parties or company claiming the tunnel right the actual or proposed course or direction of the tunnel; the height and width thereof and the course or distance from such face or point of commencement to some permanent well-known objects in the vicinity by which to fix and determine the *locus* in manner heretofore set forth applicable to locations of veins or lodes; and at the time of posting such notice they shall, in order that miners or prospectors may be enabled to determine whether or not they are within the lines of the tunnel, establish the boundary lines thereof, by stakes or monuments placed along such lines at proper intervals, to the terminus of the three thousand feet from the face or point of commencement of the tunnel, and the lines so marked will define and govern as to the specific boundaries within which prospecting for lodes not previously known to exist is prohibited while work on the tunnel is being prosecuted with reasonable diligence.

24. At the time of posting notice and marking out the lines of the tunnel as aforesaid, a full and correct copy of such notice of location defining the tunnel-claim must be filed for record with the mining recorder of the district, to which notice must be attached the sworn statement or declaration of the owners, claimants, or projectors of such tunnel, setting forth the facts in the case; stating the amount expended by themselves and their predecessors in interest in prosecuting work thereon, the extent of the work performed, and that it is *bona fide* their intention to prosecute work on the tunnel so located and described with reasonable diligence for the development of a vein or lode, or for the discovery of mines, or both, as the case may be.

This notice of location must be duly recorded, and, with the said sworn statement attached, kept on the recorder's files for future reference.

25. By a compliance with the foregoing, much needless difficulty will be avoided, and the way for the adjustment of legal rights acquired in virtue of said section 2323 will be made much more easy and certain.

26. This office will take particular care that no improper advantage is taken of this provision of law by parties making or professing to make tunnel locations, ostensibly

for the purposes named in the statute, but really for the purpose of monopolizing the lands lying in front of their tunnels, to the detriment of the mining interests and to the exclusion of *bona fide* prospectors or miners, but will hold such tunnel claimants to a strict compliance with the terms of the statutes; and a *reasonable diligence* on their part in prosecuting the work is one of the essential conditions of their implied contract. Negligence or want of due diligence will be construed as working a forfeiture of their right to all undiscovered veins on the line of such tunnel.

How to Apply for a Patent.

UNITED STATES LAW.—SEC. 393. A patent for any land claimed and located for valuable deposits may be obtained in the following manner: Any person, association, or corporation authorized to locate a claim under this chapter, having claimed and located a piece of land for such purposes, who has or have complied with the terms of this chapter, may file in the proper land office an application for a patent, under oath, showing such compliance, together with a plat and field-notes of the claim or claims in common, made by or under the direction of the United States Surveyor-General, showing accurately the boundaries of the claim or claims, which shall be distinctly marked by monuments on the ground, and shall post a copy of such plat, together with a notice of such application for a patent, in a conspicuous place on the land embraced in such plat previous to the filing of the application for a patent, and shall file an affidavit of at least two persons that such notice has been duly posted, and shall file a copy of the notice in such land office, and shall thereupon be entitled to a patent for the land, in the manner following: The register of the land office, upon the filing of such application, plat, field-notes, notices and affidavits, shall publish a notice that such application has been made, for the period of sixty days, in a newspaper to be by him designated as published nearest to such claim; and he shall also post such notice in his office for the same period. The claimant at the time of filing this application, or at any time thereafter, within the sixty days of publication, shall file with the register a certificate of the United States Surveyor-General that five hundred dollars' worth of labor has been expended or improvements made upon the claim by himself or grantors; that the plat is correct, with such further description by such reference to natural objects or permanent monuments as shall identify the claim, and furnish an accurate description, to be incorporated in the patent. At the expiration of the sixty days of publication the claimant shall file his affidavit, showing that the plat and notice have been posted in a conspicuous place on the claim during such period of publication. If no adverse claim shall have been filed with the Register and the Receiver of the proper land office at the expiration of the sixty days of publication, it shall be assumed that the applicant is entitled to a patent, upon the payment to the proper officer of five dollars per acre, and that no adverse claim exists; and thereafter no objection from third parties to the issuance of a patent shall be heard, except it be shown that the applicant has failed to comply with the terms of this chapter. Where the claimant for a patent is not a resident of or within the land district wherein the vein, lode, ledge, or deposit sought to be patented is located, the application for patent and the affidavits required to be made in this section may be made by his, her, or its authorized agent, where said agent is conversant

with the facts sought to be established; and this provision shall apply to all applications for patents to mineral lands pending on the twenty-second day of January, eighteen hundred and eighty.

LAND OFFICE REGULATIONS.—27. By section 2325 [393], authority is given for granting titles for mines by patent from the government to any person, association, or corporation, having the necessary qualifications as to citizenship and holding the right of possession to a claim in compliance with law.

28. The claimant is required in the first place to have a correct survey of his claim made under authority of the Surveyor-General of the State or Territory in which the claim lies; such survey to show with accuracy the exterior surface boundaries of the claim, which boundaries are required to be distinctly marked by monuments on the ground. Four plats and one copy of the original field-notes, in each case, will be prepared by the surveyor-general; one plat and the original field-notes to be retained in the office of the surveyor-general, one copy of the plat to be given the claimant for posting upon the claim, one plat and a copy of the field-notes to be given the claimant for filing with the proper register, to be finally transmitted by that officer, with other papers in the case, to this office, and one plat to be sent by the surveyor-general to the register of the proper land-district, to be retained on his files for future reference.

29. The claimant is then required to post a copy of the plat of such survey in a conspicuous place upon the claim, together with notice of his intention to apply for a patent therefor, which notice will give the date of posting, the name of the claimant, the name of the claim, mine, or lode; the mining district and county; whether the location is of record, and, if so, where the record may be found; the number of feet claimed along the vein, and the presumed direction thereof; the number of feet claimed on the lode in each direction from the point of discovery, or other well-defined place on the claim; the name or names of adjoining claimants on the same or other lodes; or, if none adjoin, the names of the nearest claims, etc.

30. After posting the said plat and notice upon the premises, the claimant will file with the proper register and receiver a copy of such plat, and the field-notes of survey of the claim, accompanied by the affidavit of at least two credible witnesses that such plat and notice are posted conspicuously upon the claim, giving the date and place of such posting; a copy of the *notice* so posted to be attached to, and form a part of, said affidavit.

31. Attached to the field-notes so filed must be the sworn statement of the claimant that he has the possessory right to the premises therein described, in virtue of a compliance by himself (and by his grantors, if he claims by purchase) with the mining rules, regulations, and customs of the mining district, State, or Territory in which the claim lies, and with the mining laws of Congress; such sworn statement to narrate briefly, but as clearly as possible, the facts constituting such compliance, the origin of his possession, and the basis of his claim to a patent.

32. This affidavit should be supported by appropriate evidence from the mining recorder's office as to his possessory right, as follows, viz.: Where he claims to be a locator, a full, true, and correct copy of such location should be furnished, as the same appears upon the mining records; such copy to be attested by the seal of the recorder, or if he has no seal, then he should make oath to the same being correct, as shown by his records; where the applicant claims as a locator in company with others who have since conveyed their interests in the lode to him, a copy of the original record of location should be filed, together with an abstract of title from the proper recorder, under seal or oath as aforesaid, tracing the co-locator's possessory rights in the claim to such applicant for patent; where the applicant claims only as a purchaser for valuable

consideration, a copy of the location record must be filed, under seal or upon oath as aforesaid, with an abstract of title certified as above by the proper recorder, tracing the right of possession by a continuous chain of conveyances from the original locators to the applicant.

33. In the event of the mining records in any case having been destroyed by fire or otherwise lost, affidavit of the fact should be made, and secondary evidence of possessory title will be received, which may consist of the affidavit of the claimant, supported by those of any other parties cognizant of the facts relative to his location, occupancy, possession, improvements, etc.; and in such case of lost records, any deeds, certificates of location or purchase, or other evidence, which may be in the claimant's possession, and tend to establish his claim, should be filed.

34. Upon the receipt of these papers the register will, at the expense of the claimant (who must furnish the agreement of the publisher to hold applicant for patent alone responsible for charges of publication), publish a notice of such application for the period of sixty days, in a newspaper published nearest to the claim; and will post a copy of such notice in his office for the same period. In all cases sixty days must intervene between the first and the last insertion of the notice in such newspaper. When the notice is published in a *weekly* newspaper, ten consecutive insertions are necessary; when in a *daily* newspaper, the notice must appear in each issue for the required period.

35. The notices so published and posted must be as full and complete as possible, and embrace all the *data* given in the notice posted upon the claim.

36. Too much care cannot be exercised in the preparation of these notices, inasmuch as upon their accuracy and completeness will depend, in a great measure, the regularity and validity of the whole proceeding.

37. The claimant, either at the time of filing these papers with the register, or at any time during the sixty days' publication, is required to file a certificate of the surveyor-general that not less than five hundred dollars' worth of labor has been expended or improvements made upon the claim by the applicant or his grantors; that the plat filed by the claimant is correct; that the field-notes of the survey, as filed, furnish such an accurate description of the claim as will, if incorporated into a patent, serve to fully identify the premises, and that such reference is made therein to natural objects or permanent monuments as will perpetuate and fix the *locus* thereof.

38. It will be the more convenient way to have this certificate indorsed by the surveyor-general, both upon the plat and field-notes of survey filed by the claimant as aforesaid.

39. After the sixty days' period of newspaper publication has expired, the claimant will file his affidavit, showing that the plat and notice aforesaid remained conspicuously posted upon the claim sought to be patented during said sixty days' publication, giving the dates.

40. Upon the filing of this affidavit the register will, if no adverse claim was filed in his office during the period of publication, permit the claimant to pay for the land according to the area given in the plat and field-notes of survey aforesaid, at the rate of five dollars for each acre and five dollars for each fractional part of an acre, the receiver issuing the usual duplicate receipt therefor. The claimant will also make a sworn statement of all charges and fees paid by him for publication and surveys, together with all fees and money paid the register and receiver of the land office; after which the whole matter will be forwarded to the Commissioner of the General Land Office, and a patent issued thereon if found regular.

41. In sending up the papers in the case, the register must not omit certifying to the

fact that the notice was posted in his office for the full period of sixty days, such certificate to state distinctly when such posting was done, and how long continued.

42. The consecutive series of numbers of mineral entries must be continued, whether the same are of lode or placer claims.

43. The surveyor-general must continue to designate all surveyed mineral claims as heretofore by a progressive series of numbers, beginning with lot No. 37 in each township; the claim to be so designated at date of filing the plat, field-notes, etc. in addition to the local designation of the claim; it being required in all cases that the plat and field-notes of the survey of a claim must, in addition to the reference to permanent objects in the neighborhood, describe the *locus* of the claim with reference to the lines of public surveys by a line connecting a corner of the claim with the nearest public corner of the United States surveys, unless such claim be on unsurveyed lands at a remote distance from such public corner, in which latter case the reference by course and distance to permanent objects in the neighborhood will be a sufficient designation by which to fix the *locus* until the public surveys shall have been closed upon its boundaries.

Adverse Claims.

UNITED STATES LAW.—SEC. 394. Where an adverse claim is filed during the period of publication, it shall be upon oath of the person or persons making the same, and shall show the nature, boundaries, and extent of such adverse claim; and all proceedings, except the publication of notice and making and filing of the affidavit thereof, shall be stayed until the controversy shall have been settled or decided by a court of competent jurisdiction, or the adverse claim waived. It shall be the duty of the adverse claimant, within thirty days after filing his claim, to commence proceedings in a court of competent jurisdiction, to determine the question of the right of possession, and prosecute the same with reasonable diligence to final judgment; and a failure so to do shall be a waiver of his adverse claim. After such judgment shall have been rendered, the party entitled to the possession of the claim, or any portion thereof, may, without giving further notice, file a certified copy of the judgment-roll with the register of the land office, together with the certificate of the surveyor-general that the requisite amount of labor has been expended or improvements made thereon, and the description required in other cases, and shall pay to the receiver five dollars per acre for his claim, together with the proper fees, whereupon the whole proceedings and the judgment-roll shall be certified by the register to the Commissioner of the General Land Office, and a patent shall issue thereon for the claim, or such portion thereof as the applicant shall appear, from the decision of the court, to rightly possess. If it appears from the decision of the court that several parties are entitled to separate and different portions of the claim, each party may pay for his portion of the claim, with the proper fees, and file the certificate and description by the Surveyor-General, whereupon the register shall certify the proceedings and judgment-roll to the Commissioner of the General Land Office, as in the preceding case, and patents shall issue to the several parties according to their respective rights. Nothing herein contained shall be construed to prevent the alienation of the title conveyed by a patent for a mining claim to any person whatever.

LAND OFFICE REGULATIONS.—44. Section 2326 [394], provides for adverse claims.

fixes the time within which they shall be filed to have legal effect, and prescribes the manner of their adjustment.

45. Said section requires that the adverse claim shall be filed during the period of publication of notice; that it must be on the oath of the adverse claimant; and that it must show the "*nature*," the "*boundaries*," and the "*extent*" of the adverse claim.

46. In order that this section of law may be properly carried into effect, the following has been communicated for the information of all concerned:

47. An adverse mining claim must be filed with the register of the same land-office with whom the application for patent was filed, or in his absence with the receiver, and within the sixty days' period of newspaper publication of notice.

48. The adverse notice must be duly sworn to by the person or persons making the same before an officer authorized to administer oaths within the land district, or before the register or receiver; it will fully set forth the nature and extent of the interference or conflict; whether the adverse party claims as a purchaser for valuable consideration or as a locator; if the former, a certified copy of the original location, the original conveyance, a duly certified copy thereof, or an abstract of title from the office of the proper recorder, should be furnished; or if the transaction was a mere verbal one, he will narrate the circumstances attending the purchase, the date thereof, and the amount paid, which facts should be supported by the affidavit of one or more witnesses, if any were present at the time; and if he claims as a locator, he must file a duly certified copy of the location from the office of the proper recorder.

49. In order that the "*boundaries*" and "*extent*" of the claim may be shown, it will be incumbent upon the adverse claimant to file a plat showing his entire claim, its relative situation or position with the one against which he claims, and the extent of the conflict. This plat must be made from an actual survey by a United States deputy surveyor, who will officially certify thereon to its correctness; and in addition there must be attached to such plat of survey a certificate or sworn statement by the surveyor as to the approximate value of the labor performed or improvements made upon the claim by the adverse party or his predecessors in interest, and the plat must indicate the position of any shafts, tunnels, or other improvements, if any such exist, upon the claim of the party opposing the application, and by which party said improvements were made.

50. Upon the foregoing being filed within the sixty days as aforesaid, the register, or in his absence the receiver, will give notice in writing to *both parties* to the contest that such adverse claim has been filed, informing them that the party who filed the adverse claim will be required within thirty days from the date of such filing to commence proceedings in a court of competent jurisdiction to determine the question of right of possession, and to prosecute the same with reasonable diligence to final judgment, and that should such adverse claimant fail to do so, his adverse claim will be considered waived, and the application for patent be allowed to proceed upon its merits.

51. When an adverse claim is filed as aforesaid, the register or receiver will indorse upon the same the precise date of filing, and preserve a record of the date of notifications issued thereon; and thereafter all proceedings on the application for patent will be suspended, with the exception of the completion of the publication and posting of notices and plat, and the filing of the necessary proof thereof, until the controversy shall have been adjudicated in court, or the adverse claim waived or withdrawn.

52. The proceedings after rendition of judgment by the court in such case are so clearly defined by the act itself as to render it unnecessary to enlarge thereon in this place.

Surveys to be Adjusted to the Public Surveys.

UNITED STATES LAW.—SEC. 395. The description of vein or lode claims, upon surveyed lands, shall designate the location of the claim with reference to the lines of the public surveys, but need not conform therewith; but where a patent shall be issued for claims upon unsurveyed lands, the surveyor-general, in extending the surveys, shall adjust the same to the boundaries of such patented claim, according to the plat or description thereof, but so as in no case to interfere with or change the location of any such patented claim.

Patents for Veins or Lodes issued prior to May 10, 1872.

UNITED STATES LAW.—SEC. 396. Applications for patents for mining claims under former laws now pending, may be prosecuted to a final decision in the General Land Office; but in such cases, where adverse rights are not affected thereby, patents may issue in pursuance of the provisions of this chapter; and all patents for mining claims upon veins or lodes heretofore issued shall convey all the rights and privileges conferred by this chapter where no adverse rights existed on the tenth day of May, eighteen hundred and seventy-two.

LAND OFFICE REGULATIONS.—7. Rights under patents for veins or lodes heretofore granted under previous legislation of Congress are enlarged by the Revised Statutes so as to invest the patentee, his heirs or assigns, with title to all veins, lodes, or ledges, throughout their entire depth, the top or apex of which lies within the end and side boundary-lines of his claim on the surface, as patented, extended downward vertically, although such veins, lodes, or ledges may so far depart from a perpendicular in their course downward as to extend outside the vertical side-lines of the claim at the surface. The right of possession to such outside parts of such veins or ledges to be confined to such portions thereof as lie between vertical planes drawn downward through the end-lines of the claims at the surface, so continued in their own direction that such planes will intersect such exterior parts of such veins or ledges; it being expressly provided, however, that all veins, lodes, or ledges, the top or apex of which lies inside such surface locations, *other* than the one named in the patent, which were *adversely claimed on the 10th May, 1872*, are excluded from such conveyance by patent.

8. Applications for patents for mining-claims pending at the date of the act of May 10, 1872, may be prosecuted to final decision in the General Land Office, and where no adverse rights are affected thereby, patents will be issued in pursuance of the provisions of the Revised Statutes.

Placer Claims.

UNITED STATES LAW.—SEC. 397. Claims usually called "placers," including all forms of deposit, excepting veins of quartz or other rock in place, shall be subject to entry and patent, under like circumstances and conditions, and upon similar proceedings, as are provided for vein or lode claims; but where the lands have been previously surveyed by the United States, the entry in its exterior limits shall conform to the legal subdivisions of the public lands.

LAND OFFICE REGULATIONS.—53. The proceedings to obtain patents for claims usually called placers, including all forms of deposit, are similar to the proceedings prescribed for obtaining patents for vein or lode claims; but where said placer-claim shall be upon surveyed lands, and conform to legal subdivisions, no further survey or plat will be required, and all placer-mining claims located after May 10, 1872, shall

*See additional regulations, pp. 33 to 35.

conform as nearly as practicable with the United States system of public land surveys and the rectangular subdivisions of such surveys, and no such location shall include more than twenty acres for each individual claimant; but where placer-claims cannot be conformed to legal subdivisions, survey and plat shall be made as on unsurveyed lands. But where such claims are located previous to the public surveys, and do not conform to legal subdivisions, survey, plat, and entry thereof may be made according to the boundaries thereof, provided the location is in all respects legal.

54. The proceedings for obtaining patents for veins or lodes having already been fully given, it will not be necessary to repeat them here; it being thought that careful attention thereto by applicants and the local officers will enable them to act understandingly in the matter, and make such slight modifications in the notice, or otherwise, as may be necessary in view of the different nature of the two classes of claims; placer-claims being fixed, however, at two dollars and fifty cents per acre, or fractional part of an acre.

60. When an adverse claim is filed to a placer application, the proceedings are the same as in the case of vein or lode claims, already described.

Placer Claims Containing Lodes.

UNITED STATES LAW.—SEC. 401. Where the same person, association, or corporation is in possession of a placer claim, and also a vein or lode included within the boundaries thereof, application shall be made for a patent for a placer claim, with the statement that it includes such vein or lode, and in such case a patent shall issue for the placer claim, subject to the provisions of this chapter, including such vein or lode, upon the payment of five dollars per acre for such vein or lode claim, and twenty-five feet of surface on each side thereof. The remainder of the placer claim, or any placer claim not embracing any vein or lode claim, shall be paid for at the rate of two dollars and fifty cents per acre, together with all costs of proceedings; and where a vein or lode, such as is described in section three hundred and eighty-eight, is known to exist within the boundaries of a placer claim, an application for a patent for such placer claim, which does not include an application for the vein or lode claim, shall be construed as a conclusive declaration that the claimant of the placer claim has no right of possession of the vein or lode claim; but where the existence of a vein or lode in a placer claim is not known, a patent for the placer claim shall convey all valuable mineral and other deposits within the boundaries thereof.

LAND OFFICE REGULATIONS.—59. Applicants for patent to a placer-claim, who are also in possession of a known vein or lode included therein, must state in their application that the placer includes such vein or lode. The published and posted notices must also include such statement; and the vein or lode must be surveyed and marked upon the plat; the field-notes and plat giving the area of the lode claim or claims and the area of the placer separately. If veins or lodes lying within a placer location are owned by other parties, the fact should be distinctly stated in the application for patent, and in all the notices. It should be remembered that an application which omits to include an application for a known vein or lode therein, must be construed as a conclusive declaration that the applicant has no right of possession to the vein or lode. Where there is no known lode or vein, the fact must appear by the affidavit of claimant and one or more witnesses.

Placer Locations.

UNITED STATES LAW.—SEC. 398. Legal subdivisions of forty acres may be subdivided into ten-acre tracts; and two or more persons, or associations of persons, having contiguous claims of any size, although such claims may be less than ten acres each, may make joint entry thereof; but no location of a placer claim, made after the ninth day of July, eighteen hundred and seventy, shall exceed one hundred and sixty acres for any one person or association of persons, which location shall conform to the United States surveys; and nothing in this section contained shall defeat or impair any bona fide pre-emption or homestead claim upon agricultural lands, or authorize the sale of the improvements of any bona fide settler to any purchaser.

SEC. 399. Where placer claims are upon surveyed lands, and conform to legal subdivisions, no further survey or plat shall be required, and all placer-mining claims located after the tenth day of May, eighteen hundred and seventy-two, shall conform as near as practicable with the United States system of public land surveys, and the rectangular subdivisions of such surveys, and no such location shall include more than twenty acres for each individual claimant; but where placer claims cannot be conformed to legal subdivisions, survey and plat shall be made as on unsurveyed lands; and where by the segregation of mineral land in any legal subdivision a quantity of agricultural land, less than forty acres remains, such fractional portion of agricultural land may be entered by any party qualified by law, for homestead or pre-emption purposes.

LAND OFFICE REGULATIONS.—61. By section 2330 [398] it is declared that no location of a placer-claim made after July 9, 1870, shall exceed one hundred and sixty acres for any one person or association of persons, which location shall conform to the United States surveys.

62. Section 2331 [399] provides that all placer-mining claims located after May 10, 1872, shall conform as nearly as practicable with the United States system of public surveys and the subdivisions of such surveys, and no such locations shall include more than twenty acres for each individual claimant.

63. The foregoing provisions of law are construed to mean that after the 9th day of July, 1870, no location of a placer-claim can be made to exceed one hundred and sixty acres, whatever may be the number of locators associated together, or whatever the local regulations of the district may allow; and that from and after May 10, 1872, no location made by an individual can exceed twenty acres, and no location made by an association of individuals can exceed one hundred and sixty acres, which location of one hundred and sixty acres cannot be made by a less number than eight *bona fide* locators; and no local laws or mining regulations can restrict a placer location to less than twenty acres, although the locator is not compelled to take so much.

64. The regulations hereinbefore given as to the manner of marking locations on the ground, and placing the same on record, must be observed in the case of placer locations, so far as the same are applicable; the law requiring, however, that where placer-claims are upon *surveyed* public lands, the locations must hereafter be made to conform to legal subdivisions thereof as near as practicable.

Legal Subdivisions—Ten-Acre Tracts.

LAND OFFICE REGULATIONS.—55. By section 2330, authority is given for the subdivision of forty-acre legal subdivisions into *ten-acre* lots, which is intended for the

greater convenience of miners in segregating their claims both from one another and from intervening agricultural lands.

56. It is held, therefore, that under a proper construction of the law these ten-acre lots in mining districts should be considered and dealt with, to all intents and purposes, as legal subdivisions, and that an applicant having a legal claim which conforms to one or more of these ten-acre lots, either adjoining or cornering, may make entry thereof, after the usual proceedings, without further survey or plat.

57. In cases of this kind, however, the notice given of the application must be very specific and accurate in description, and as the forty-acre tracts may be subdivided into ten-acre lots, either in the form of squares of ten by ten chains, or of parallelograms five by twenty chains, so long as the lines are parallel and at right angles with the lines of the public surveys, it will be necessary that the notice and application state specifically what ten-acre lots are sought to be patented, in addition to the other *data* required in the notice.

58. Where the ten-acre subdivision is in the form of a square, it may be described, for instance, as the "S. E. ¼ of the S. W. ¼ of N. W. ¼," or, if in the form of a parallelogram as aforesaid, it may be described as the "W. ½ of the W. ½ of the S. W. ¼ of the N. W. ¼ (or the N. ½ of the S. ½ of the N. E. ¼ of the S. E. ¼) of section ———, township ———, range ———," as the case may be; but, in addition to this description of the land, the notice must give all the other *data* that is required in a mineral application, by which parties may be put on inquiry as to the premises sought to be patented. The proof submitted with applications for claims of this kind must show clearly the character and the extent of the improvements upon the premises.

Proofs of Possessory Rights—Liens—Limitations.

UNITED STATES LAW.—SEC. 400. Where such person or association, they and their grantors, have held and worked their claims for a period equal to the time prescribed by the statute of limitations for mining claims of the State or Territory where the same may be situated, evidence of such possession and working of the claims for such period shall be sufficient to establish a right to a patent thereto under this chapter, in the absence of any adverse claim; but nothing in this chapter shall be deemed to impair any lien which may have attached in any way whatever to any mining claim or property thereto attached prior to the issuance of a patent.

LAND OFFICE REGULATIONS.—65. With regard to the proofs necessary to establish the possessory right to a placer-claim, section 2332 provides that "where such person or association, they and their grantors, have held and worked their claims for a period equal to the time prescribed by the statute of limitations for mining-claims of the State or Territory where the same may be situated, evidence of such possession and working of the claims for such period shall be sufficient to establish a right to a patent thereto under this chapter, in the absence of any adverse claim."

66. This provision of law will greatly lessen the burden of proof, more especially in the case of old claims located many years since, the records of which, in many cases, have been destroyed by fire, or lost in other ways during the lapse of time, but concerning the possessory right to which all controversy or litigation has long been settled.

67. When an applicant desires to make his proof of possessory right in accordance with this provision of law, you will not require him to produce evidence of location, copies of conveyances, or abstracts of title, as in other cases, but will require him to furnish a duly certified copy of the statute of limitations of mining-claims for the State

or Territory, together with his sworn statement giving a clear and succinct narration of the facts as to the origin of his title, and likewise as to the continuation of his possession of the mining-ground covered by his application; the area thereof, the nature and extent of the mining that has been done thereon; whether there has been any opposition to his possession, or litigation with regard to his claim, and, if so, when the same ceased; whether such cessation was caused by compromise or by judicial decree; and any additional facts within the claimant's knowledge having a direct bearing upon his possession and *bona fides* which he may desire to submit in support of his claim.

68. There should likewise be filed a certificate, under seal of the court having jurisdiction of mining cases within the judicial district embracing the claim, that no suit or action of any character whatever involving the right of possession to any portion of the claim applied for is pending, and that there has been no litigation before said court affecting the title to said claim or any part thereof for a period equal to the time fixed by the statute of limitations for mining-claims in the State or Territory as aforesaid, other than that which has been finally decided in favor of the claimant.

69. The claimant should support his narrative of facts relative to his possession, occupancy, and improvements by corroborative testimony of any disinterested person or persons of credibility who may be cognizant of the facts in the case, and are capable of testifying understandingly in the premises.

70. It will be to the advantage of claimants to make their proofs as full and complete as practicable.

Mill-sites.

UNITED STATES LAW.—SEC. 405. Where non-mineral land not contiguous to the vein or lode is used or occupied by the proprietor of such vein or lode for mining or milling purposes, such non-adjacent surface-ground may be embraced and included in an application for a patent for such vein or lode, and the same may be patented therewith, subject to the same preliminary requirements as to survey and notice as are applicable to veins or lodes; but no locations hereafter made of such non-adjacent land shall exceed five acres, and payment for the same must be made at the same rate as fixed by this chapter for the superficies of the lode. The owner of a quartz mill or reduction works, not owning a mine in connection therewith, may also receive a patent for his mill-site, as provided in this section.

LAND OFFICE REGULATIONS.—71. Section 2337 [405] provides that "where non-mineral land not contiguous to the vein or lode is used or occupied by the proprietor of such vein or lode for mining or milling purposes, such non-adjacent surface-ground may be embraced and included in an application for a patent for such vein or lode, and the same may be patented therewith, subject to the same preliminary requirements as to survey and notice as are applicable to veins or lodes; but no location hereafter made of such non-adjacent land shall exceed five acres, and payment for the same must be made at the same rate as fixed by this chapter for the superficies of the lode. The owner of a quartz-mill or reduction-works, not owning a mine in connection therewith, may also receive a patent for his mill-site, as provided in this section."

72. To avail themselves of this provision of law, parties holding the possessory right to a vein or lode, and to a piece of non-mineral land not contiguous thereto, for mining or milling purposes, not exceeding the quantity allowed for such purpose by section 2337 United States Revised Statutes, or prior laws under which the land was appropriated, the proprietors of such vein or lode may file in the proper land-office their application for a patent, under oath, in manner already set forth herein, which applica-

tion, together with the plat and field-notes, may include, embrace, and describe, in addition to the vein or lode, such non-contiguous mill-site, and after due proceedings as to notice, etc., a patent will be issued conveying the same as one claim.

73. In making the survey in a case of this kind, the lode-claim should be described in the plat and field-notes as "Lot No. 37, A." and the mill-site as "Lot No. 37, B." or whatever may be its appropriate numerical designation; the course and distance from a corner of the mill-site to a corner of the lode-claim to be invariably given in such plat and field-notes, and a copy of the plat and notice of application for patent must be conspicuously posted upon the mill-site as well as upon the vein or lode for the statutory period of sixty days. In making the entry no separate receipt or certificate need be issued for the mill-site, but the whole area of both lode and mill-site will be embraced in one entry, the price being five dollars for each acre and fractional part of an acre embraced by such lode and mill-site claim.

74. In case the owner of a quartz-mill or reduction-works is not the owner or claimant of a vein or lode, the law permits him to make application therefor in the same manner prescribed herein for mining-claims; and after due notice and proceedings, in the absence of a valid adverse filing, to enter and receive a patent for his mill-site at said price per acre.

75. In every case there must be a satisfactory proof that the land claimed as a mill-site is not mineral in character, which proof may, where the matter is unquestioned, consist of the sworn statement of the claimant, supported by that of one or more disinterested persons capable from acquaintance with the land to testify understandingly.

76. The law expressly limits mill-site locations made from and after its passage to *five acres*.

Proof of Citizenship.

UNITED STATES LAW.—SEC. 389. Proof of citizenship, under this chapter, may consist, in the case of an individual, of his own affidavit thereof; in the case of an association of persons unincorporated, of the affidavit of their authorized agent, made on his own knowledge, or upon information and belief; and in the case of a corporation organized under the laws of the United States, or of any state or territory thereof, by the filing of a certified copy of their charter or certificate of incorporation.

LAND OFFICE REGULATIONS.—78. The proof necessary to establish the citizenship of applicants for mining-patents must be made in the following manner: In case of an incorporated company, a certified copy of their charter or certificate of incorporation must be filed. In case of an association of persons unincorporated, the affidavit of their duly authorized agent, made upon his own knowledge, or upon information and belief, setting forth the residence of each person forming such association, must be submitted. This affidavit must be accompanied by a power of attorney from the parties forming such association, authorizing the person who makes the affidavit of citizenship to act for them in the matter of their application for patent.

79. In case of an individual or an association of individuals who do not appear by their duly authorized agent, you will require the affidavit of each applicant, showing whether he is a native or naturalized citizen, when and where born, and his residence.

80. In case an applicant has declared his intention to become a citizen, or has been naturalized, his affidavit must show the date, place, and the court before which he declared his intention, or from which his certificate of citizenship issued, and present residence

81. The affidavit of citizenship may be taken before the Register and Receiver, or any other officer authorized to administer oaths within the district.

Deputy Surveyors—Charges and Fees.

UNITED STATES LAW.—SEC. 402. The Surveyor-general of the United States may appoint in each land district containing mineral lands as many competent surveyors as shall apply for appointment to survey mining claims. The expenses of the survey of vein or lode claims, and the survey and sub-division of placer claims into smaller quantities than one hundred and sixty acres, together with the cost of publication of notices, shall be paid by the applicants, and they shall be at liberty to obtain the same at the most reasonable rates, and they shall also be at liberty to employ any United States deputy-surveyor to make the survey. The Commisioner of the General Land Office shall also have power to establish the maximum charges for surveys and publication of notices under this chapter; and, in case of excessive charges for publication, he may designate any newspaper published in a land district where mines are situated for the publication of mining notices in such district, and fix the rates to be charged by such paper; and, to the end that the Commissioner may be fully informed on the subject, each applicant shall file with the Register a sworn statement of all charges and fees paid by such applicant for publication and surveys, together with all fees and money paid the Register and the Receiver of the land office, which statement shall be transmitted, with the other papers in the case, to the Commissioner of the General Land Office.

LAND OFFICE REGULATIONS.—82. Section 2334 [402] provides for the appointment of surveyors of mineral claims, authorizes the Commissioner of the General Land Office to establish the rates to be charged for surveys and for newspaper publications, prescribes the fees allowed to the local officers for receiving and acting upon applications for mining-patents and for adverse claims thereto, etc.

83. The surveyors-general of the several districts will, in pursuance of said law, appoint in each land district as many *competent* deputies for the survey of mining-claims as may seek such appointment; it being distinctly understood that all expenses of these notices and surveys are to be borne by the mining-claimants and not by the United States; the system of making *deposits* for mineral surveys, as required by previous instructions, being hereby revoked as regards *field-work;* the claimant having the option of employing *any* deputy-surveyor within such district to do his work in the field.

84. With regard to the *platting* of the claim and other *office-work* in the surveyor-general's office, that officer will make an estimate of the cost thereof, which amount the claimant will deposit with any assistant United States Treasurer, or designated depository, in favor of the United States Treasurer, to be passed to the credit of the fund created by "individual depositors for surveys of the public lands," and file with the surveyor-general duplicate certificates of such deposit in the usual manner.

85. The surveyors-general will endeavor to appoint mineral deputy surveyors so that one or more may be located in each mining district for the greater convenience of miners.

86. The usual oaths will be required of these deputies and their assistants as to the correctness of each survey executed by them.

87. The law requires that each applicant shall file with the Register and Receiver a sworn statement of all charges and fees paid by him for publication of notice and for

survey; together with all fees and moneys paid the Register and Receiver, which sworn statement is required to be transmitted to this office, for the information of the Commissioner.

88. Should it appear that excessive or exorbitant charges have been made by any surveyor or any publisher, prompt action will be taken with the view of correcting the abuse.

89. The fees payable to the Register and Receiver for filing and acting upon applications for mineral-land patents are five dollars to each officer, to be paid by the applicant for patent at the time of filing, and the like sum of five dollars is payable to each officer by an adverse claimant at the time of filing his adverse claim.

90. All fees or charges under this law may be paid in United States currency.

91. The Register and Receiver will, at the close of each month, forward to this office an abstract of mining applications filed, and a register of receipts, accompanied with an abstract of mineral lands sold, and an abstract of adverse claims filed.

92. The fees and purchase-money received by Registers and Receivers must be placed to the credit of the United States in the Receiver's monthly and quarterly account, charging up in the disbursing account the sums to which the Register and Receiver may be respectively entitled as fees and commissions, with limitations in regard to the legal maximum.

Affidavits—Hearings to Establish the Character of Lands.

UNITED STATES LAW.—SEC. 403. All affidavits required to be made under this chapter may be verified before any officer authorized to administer oaths within the land district where the claims may be situated, and all testimony and proofs may be taken before any such officer, and, when duly certified by the officer taking the same, shall have the same force and effect as if taken before the Register and Receiver of the land office. In cases of contest as to the mineral or agricultural character of land, the testimony and proofs may be taken as herein provided, on personal notice of at least ten days to the opposing party; or if such party cannot be found, then by publication of at least once a week for thirty days in a newspaper, to be designated by the Register of the land office as published nearest to the location of such land; and the Register shall require proof that such notice has been given.

LAND OFFICE REGULATIONS.—93. Section 2335 [403] provides that all affidavits required under this chapter may be verified before *any* officer authorized to administer oaths within the land-district where the claims may be situated, and all testimony and proofs may be taken before any such officer, and when duly certified by the officer taking the same, shall have the same force and effect as if taken before the Register and Receiver of the land office.

94. Hearings of this character, as practically distinguished, are of two kinds.

1st. Where lands which are sought to be entered and patented as agricultural are alleged by affidavit to be mineral, or when sought as mineral their non-mineral character is alleged.

The proceedings relative to this class are in the nature of a contest between two or more known parties, and the testimony may be taken on personal notice of at least ten days, duly served on all parties; or, if they cannot be found, then by publication for thirty days in a newspaper of general circulation, to be designated by the Register of the land office as published nearest to the land in controversy. If publication is made in a weekly newspaper, the notice must be inserted in five consecutive weekly issues thereof.

2d. When lands are returned as mineral by the Surveyor-general, or are withdrawn as mineral by direction of this office.

When such lands are sought to be entered as agricultural, notice must be given by publication for thirty days, as aforesaid, and also by posting in a conspicuous place on each forty-acre subdivision of the land claimed, for the same period.

95. All notices must describe the land, give the name and address of the claimant, the character of his claim, and the time, place, and purpose of the hearing.

Proof of service of notice, when personal, must consist of either acknowledgment of service indorsed on the citation (which is always desirable), or the affidavit of the party serving the same, giving date, place, and manner of service, indorsed as aforesaid.

Proof of publication must be the affidavit of the publisher of the newspaper, stating the period of publication, giving dates, stating whether in a daily or weekly issue; and a copy of the notice so published must be attached to, and form a part of, the affidavit.

Proof of posting on the claim must be made by the affidavits of two or more persons who state when and where the notice was posted; that it remained so posted during the prescribed period, giving dates, and a copy of the notice so posted must be attached to, and made a part of, the affidavit.

Proof of notice is indispensable to the regularity of proceedings, and must accompany the record in every case.

The expense of notice must in every case be paid by the parties thereto.

96. At the hearing there must be filed the affidavit of the publisher of the paper that the said notice was published for the required time, stating when and for how long such publication was made, a printed copy thereof to be attached and made a part of the affidavit. In every case where practicable, in addition to the foregoing, *personal* notice must be served upon the mineral affiants, and upon any parties who may be mining upon or claiming the land.

97. At the hearing, the claimants and witnesses will be thoroughly examined with regard to the character of the land; whether the same has been thoroughly prospected; whether or not there exists within the tract or tracts claimed any lode or vein of quartz or other rock in place, bearing gold, silver, cinnabar, lead, tin, or copper, or other valuable deposit which has ever been claimed, located, recorded, or worked; whether such work is entirely abandoned, or whether occasionally resumed; if such lode does exist, by whom claimed, under what designation, and in which subdivision of the land it lies; whether any placer-mine or mines exist upon the land; if so, what is the character thereof—whether of the shallow-surface description, or of the deep cement, blue lead, or gravel deposits; to what extent mining is carried on when water can be obtained, and what the facilities are for obtaining water for mining purposes; upon what particular ten-acre subdivisions mining has been done, and at what time the land was abandoned for mining purposes, if abandoned at all.

98. The testimony should also show the agricultural capacities of the land, what kind of crops are raised thereon, and the value thereof; the number of acres actually cultivated for crops of cereals or vegetables, and within which particular ten-acre subdivisions such crops are raised; also which of these subdivisions embrace his improvements, giving in detail the extent and value of his improvements, such as house, barn, vineyard, orchard, fencing, etc.

99. It is thought that *bona fide* settlers upon lands really agricultural will be able to show, by a clear, logical, and succinct chain of evidence, that their claims are founded upon law and justice; while parties who have made little or no permanent agricultural improvements, and who only seek title for speculative purposes, on account of the mineral deposits known to themselves to be contained in the land, will be defeated in their intentions.

100. The testimony should be as full and complete as possible; and, in addition to the leading points indicated above, everything of importance bearing upon the question of the character of the land should be elicited at the hearing.

101. Where the testimony is taken before an officer who does not use a seal, other than the Register and Receiver, the official character of such officer must be attested by a clerk of a court of record, and the testimony transmitted to the Register and Receiver, who will thereupon examine and forward the same to this office, with their joint opinion as to the character of the land as shown by the testimony.

102. When the case comes before this office, such an award of the land will be made as the law and the facts may justify; and in cases where a survey is necessary to set apart the mineral from the agricultural land in any forty-acre tract, the necessary instructions will be issued to enable the agricultural claimant, *at his own expense*, to have the work done, at his option, either by United States deputy, county, or other local surveyor; the survey in such case may be executed in such manner as will segregate the portion of land actually containing the mine, and used as surface-ground for the convenient working thereof, from the remainder of the tract, which remainder will be patented to the agriculturist to whom the same may have been awarded; subject, however, to the condition that the land may be entered upon by the proprictor of any vein or lode for which a patent has been issued by the United States, for the purpose of extracting and removing the ore from the same, where found to penetrate or intersect the land so patented as agricultural, as stipulated by the mining act.

103. Such survey when executed must be properly sworn to by the surveyor, either before a notary public, officer of a court of record, or before the Register or Receiver, the deponent's character and credibility to be properly certified to by the officer administering the oath.

104. Upon the filing of the plat and field-notes of such survey, duly sworn to as aforesaid, you will transmit the same to the surveyor-general for his verification and approval; who, if he finds the work correctly performed, will properly mark out the same upon the original township-plat in his office, and furnish authenticated copies of such plat and description both to the proper local land office and to this office, to be affixed to the duplicate and triplicate township-plats respectively.

105. In cases where a portion of a forty-acre tract is awarded to an agricultural claimant, and he causes the segregation thereof from the mineral portion, as aforesaid, such agricultural portion will not be given a numerical designation as in the case of surveyed mineral claims, but will simply be described as the "Fractional ——— quarter of the ——— quarter of section ———, in township ———, of range ———, meridian ———, containing ——— acres, the same being exclusive of the land adjudged to be mineral in said forty-acre tract."

106. The surveyor must correctly compute the area of such agricultural portion, which computation will be verified by the surveyor-general.

107. After the authenticated plat and field-notes of the survey have been received from the surveyor-general, this office will issue the necessary order for the entry of the land, and in issuing the Receiver's receipt and Register's patent certificate you will invariably be governed by the description of the land given in the order from this office.

108. The fees for taking testimony and reducing the same to writing in these cases will have to be defrayed by the parties in interest. Where such testimony is taken before any other officer than the Register and the Receiver, the Register and Receiver will be entitled to no fees.

109. If, upon a review of the testimony at this office, a ten-acre tract should be found to be properly mineral in character, that fact will be no bar to the execution of the settler's legal right to the remaining *non-mineral* portion of his claim, if contiguous.

110. No fear need be entertained that miners will be permitted to make entries of tracts ostensibly as mining-claims, which are not mineral, simply for the purpose of obtaining possession and defrauding settlers out of their valuable agricultural improvements; it being almost an impossibility for such a fraud to be consummated under the laws and regulations applicable to obtaining patents for mining-claims.

111. The fact that a certain tract of land is decided upon testimony to be mineral in character is by no means equivalent to an award of the land to a miner. A miner is compelled by law to give sixty days' publication of notice, and posting of diagrams and notices, as a preliminary step; and then, before he can enter the land, he must show that the land yields mineral; that he is entitled to the possessory right thereto in virtue of compliance with local customs or rules of miners, or by virtue of the statute of limitations; that he or his grantors have expended, in actual labor and improvements, an amount of not less than five hundred dollars thereon; and that the claim is one in regard to which there is no controversy or opposing claim. After all these proofs are met, he is entitled to have a survey made at his own cost where a survey is required, after which he can enter and pay for the land embraced by his claim.

Water Rights.

UNITED STATES LAW.—SEC. 407. Whenever, by priority of possession, rights to the use of water for mining, agricultural, manufacturing, or other purposes, have vested and accrued, and the same are recognized and acknowledged by the local customs, laws, and the decisions of courts, the possessors and owners of such vested rights shall be maintained and protected in the same; and the right of way for the construction of ditches and canals for the purposes herein specified is acknowledged and confirmed; but whenever any person, in the construction of any ditch or canal, injures or damages the possession of any settler on the public domain, the party committing such injury or damage shall be liable to the party injured for such injury or damage.

SEC. 408. All patents granted, or pre-emptions or homesteads allowed, shall be subject to any vested and accrued water-rights, or rights to ditches and reservoirs used in connection with such water-rights, as may have been acquired under or recognized by the preceding section.

Easements.

UNITED STATES LAW.—SEC. 406. As a condition of sale, in the absence of necessary legislation by Congress, the local legislature of any state or territory may provide rules for working mines, involving easements, drainage, and other necessary means to their complete development; and those conditions shall be fully expressed in the patent.

Homestead and Pre-emption Claims.

UNITED STATES LAW.—SEC. 409. Wherever, upon the lands heretofore designated as mineral lands, which have been excluded from survey and sale, there have been homesteads made by citizens of the United States, or persons who have declared their intention to become citizens, which homesteads have been made, improved, and used for agricultural purposes, and upon which there have been no valuable mines of gold, silver, cinnabar, or copper discovered, and which are properly agricultural lands, the settlers or owners of such homesteads shall have a right of pre-emption thereto, and shall be entitled to purchase the same at the price of one dollar and twenty-five cents per

acre, and in quantity not to exceed one hundred and sixty acres; or they may avail themselves of the provisions of chapter eight, relating to "Homesteads."

SEC. 410. Upon the survey of the lands described in the preceding section, the Secretary of the Interior may designate and set apart such portions of the same as are clearly agricultural lands, which lands shall thereafter be subject to pre-emption and sale as other public lands, and be subject to all the laws and regulations applicable to the same.

Certain States Excepted.

UNITED STATES LAW.—SEC. 413. The provisions of the preceding sections of this chapter shall not apply to the mineral lands situated in the States of Michigan, Wisconsin, and Minnesota, which are declared free and open to exploration and purchase, according to legal subdivisions, in like manner as before the tenth day of May, eighteen hundred and seventy-two. And any bona fide entries of such lands within the States named since the tenth day of May, eighteen hundred and seventy-two, may be patented without reference to any of the foregoing provisions of this chapter. Such lands shall be offered for public sale in the same manner, at the same minimum price, and under the same rights of pre-emption, as other public lands.

SEC. 414. Within the States of Missouri and Kansas, deposits of coal, iron, lead, or other mineral, are excluded from the operation of the preceding sections of this chapter, and all lands in said States shall be subject to disposal as agricultural lands.

Miscellaneous.

UNITED STATES LAW.—SEC. 412. Nothing contained in this chapter shall be construed to impair, in any way, rights or interests in mining property acquired under existing laws; nor to affect the provisions of the act entitled "An act granting to A. Sutro the right of way and other privileges, to aid in the construction of a draining and exploring tunnel to the Comstock lode, in the State of Nevada," approved July twenty-five, eighteen hundred and sixty-six.

SEC. 415. No act passed at the first session of the Thirty-eighth Congress, granting lands to States or corporations to aid in the construction of roads or for other purposes, or to extend the time of grants made prior to the thirtieth day of January, eighteen hundred and sixty-five, shall be so construed as to embrace mineral lands, which in all cases are reserved exclusively to the United States, unless otherwise specially provided in the act or acts making the grant; and all mineral lands are excepted from the operation and grants of laws heretofore granting lands to the State of Colorado.

REVISED STATUTES.—SEC. 2343. The President is authorized to establish additional land districts, and to appoint the necessary officers under existing laws, wherever he may deem the same necessary for the public convenience in executing the provisions of this chapter.

Annual Expenditure.

ACT OF CONGRESS OF JANUARY 22, 1880.—An Act to amend sections twenty-three hundred and twenty-four and twenty-three hundred and twenty-five of the Revised Statutes of the United States concerning mineral lands.

Be it enacted, etc., That section twenty-three hundred and twenty-five of the Revised Statutes of the United States be amended by adding thereto the following words: "*Provided*, That where the claimant for a patent is not a resident of or within the land district wherein the vein, lode, ledge or deposit sought to be patented is located, the application for patent and the affidavits required to be made in this section by the claimant for such patent may be made by his, her, or its authorized agent, where said agent is conversant with the facts sought to be established by said affidavits: *And provided*, That this section shall apply to all applications now pending for patents to mineral lands."

SEC. 2. That section twenty-three hundred and twenty-four of the Revised Statutes of the United States be amended by adding the following words: "*Provided*, That the period within which the work required to be done annually on all unpatented mineral claims shall commence on the first day of January succeeding the date of location of such claim, and this section shall apply to all claims located since the tenth day of May, anno Domini eighteen hundred and seventy-two."

LAND OFFICE REGULATIONS.—The first section of this act has reference only to the affidavits mentioned in Section 2325 [393] of the Revised Statutes. It is therefore held that it has no reference to the manner of establishing proof of citizenship. An applicant for mining patent who resides in the land-district in which the mine is located, if within the district at the time the application is made, must make the required affidavits. If he is not so within the district, the affidavits may be made by a duly-appointed agent conversant with the facts.

It is held, under the second section of the act, that labor performed or money expended upon a mining-claim prior to the first day of January succeeding the date of location thereof, will not be considered as a part of or applied upon the first annual expenditure required by law. Thus, upon a claim located at any time during the year 1880, the *period* within which the labor must be performed commences January 1, 1881, and *during* the calendar year 1881 the expenditure must be made, or the claim will be subject to re-location on and after January 1, 1882.

In order to apply the law to a claim located prior to the year 1880, it will be necessary to calculate from the date of location. For instance, upon a claim located in 1875, the first expenditures would be reckoned as due within one year from January 1, 1876, to wit: January 1, 1877, and *annually* thereafter by the *calendar year*.

Timber Cutting.

ACT OF CONGRESS OF JUNE 3, 1878.—An Act authorizing the citizens of Colorado, Nevada, and the Territories, to fell and remove timber on the public domain for mining and domestic purposes.

Be it enacted, etc., That all citizens of the United States and other persons, *bona fide* residents of the State of Colorado or Nevada, or either of the Territories of New Mexico, Arizona, Utah, Wyoming, Dakota, Idaho, or Montana, and all other mineral districts of the United States, shall be, and are hereby, authorized and permitted to fell and remove, for building, agricultural, mining, or other domestic purposes, any timber or other trees growing or being on the public lands, said lands being mineral, and not subject to entry under existing laws of the United States, except for mineral entry, in either of said States, Territories, or districts, of which such citizens or persons may be at the time *bona fide* residents, subject to such rules and regulations as the Secretary

of the Interior may prescribe for the protection of the timber and of the undergrowth growing upon such lands, and for other purposes: *Provided*, The provisions of this act shall not extend to railroad corporations.

SEC. 2. That it shall be the duty of the Register and the Receiver of any local land office in whose district any mineral land may be situated, to ascertain from time to time whether any timber is being cut or used upon any such lands, except for the purposes authorized by this act, within their respective land districts; and, if so, they shall immediately notify the Commissioner of the General Land Office of that fact; and all necessary expenses incurred in making such proper examinations shall be paid and allowed such Register and Receiver in making up their next quarterly accounts.

SEC. 3. Any person or persons who shall violate the provisions of this act, or any rules and regulations in pursuance thereof made by the Secretary of the Interior, shall be deemed guilty of a misdemeanor, and, upon conviction, shall be fined in any sum not exceeding five hundred dollars, and to which may be added imprisonment for any term not exceeding six months.

Timber and Stone.

ACT OF CONGRESS OF JUNE 3, 1878.—An Act for the sale of timber lands in the States of California, Oregon, Nevada, and in Washington Territory.

Be it enacted, etc., That surveyed public lands of the United States within the States of California, Oregon, and Nevada, and in Washington Territory, not included within military, Indian, or other reservations of the United States, valuable chiefly for timber, but unfit for cultivation, and which have not been offered at public sale according to law, may be sold to citizens of the United States, or persons who have declared their intention to become such, in quantities not exceeding one hundred and sixty acres to any one person or association of persons, at the minimum price of two dollars and fifty cents per acre; and lands valuable chiefly for stone may be sold on the same terms as timber lands: *Provided*, That nothing herein contained shall defeat or impair any *bona fide* claim under any law of the United States, or authorize the sale of any mining claim, or the improvements of any *bona fide* settler, or lands containing gold, silver, cinnabar, copper, or coal, or lands selected by the said States under any law of the United States donating lands for internal improvements, education, or other purposes: *And provided further*, That none of the rights conferred by the act approved July twenty-sixth, eighteen hundred and sixty-six, entitled "An Act granting the right of way to ditch and canal owners over the public lands, and for other purposes," shall be abrogated by this act; and all patents granted shall be subject to any vested and accrued water-rights, or rights to ditches and reservoirs used in connection with such water-rights, as may have been acquired under and by the provisions of said act; and such rights shall be expressly reserved in any patent issued under this act.

SEC. 2. That any person desiring to avail himself of the provisions of this act shall file with the Register of the proper district a written statement in duplicate, one of which is to be transmitted to the Gen-

eral Land Office, designating by legal subdivisions the particular tract of land he desires to purchase, setting forth that the same is unfit for cultivation, and valuable chiefly for its timber or stone; that it is uninhabited; contains no mining or other improvements, except for ditch or canal purposes, where any such do exist, save such as were made by or belong to the applicant, nor, as deponent verily believes, any valuable deposit of gold, silver, cinnabar, copper, or coal; that deponent has made no other application under this act; that he does not apply to purchase the same on speculation, but in good faith to appropriate it to his own exclusive use and benefit; and that he has not, directly or indirectly, made any agreement or contract, in any way or manner, with any person or persons whatsoever, by which the title which he might acquire from the Government of the United States should inure, in whole or in part, to the benefit of any person except himself; which statement must be verified by the oath of the applicant before the Register or the Receiver of the land office within the district where the land is situated; and if any person taking such oath shall swear falsely in the premises, he shall be subject to all the pains and penalties of perjury, and shall forfeit the money which he may have paid for said lands, and all right and title to the same; and any grant or conveyance which he may have made, except in the hands of *bona fide* purchasers, shall be null and void.

SEC. 3. That upon the filing of said statement, as provided in the second section of this act, the Register of the land office shall post a notice of such application, embracing a description of the land by legal subdivisions, in his office, for a period of sixty days, and shall furnish the applicant a copy of the same for publication, at the expense of such applicant, in a newspaper published nearest the location of the premises, for a like period of time; and after the expiration of said sixty days, if no adverse claim shall have been filed, the person desiring to purchase shall furnish to the Register of the land office satisfactory evidence, first, that said notice of the application prepared by the Register as aforesaid was duly published in a newspaper as herein required; secondly, that the land is of the character contemplated in this act, unoccupied and without improvements, other than those excepted, either mining or agricultural, and that it apparently contains no valuable deposits of gold, silver, cinnabar, copper, or coal; and upon payment to the proper officer of the purchase-money of said land, together with the fees of the Register and the Receiver, as provided for in case of mining claims in the twelfth section of the act approved May tenth, eighteen hundred and seventy-two, the applicant may be permitted to enter said tract, and, on the transmission to the General Land Office of the papers and testimony in the case, a patent shall issue thereon: *Provided*, That any person having a valid claim to any portion of the land may object, in writing, to the issuance of a patent to lands so held by him, stating the nature of his claim thereto; and evidence shall be taken, and the merits of said objection shall be determined by the officers of the land office, subject to appeal, as in other land cases. Effect shall be given to the foregoing provisions of this act by regulations to be prescribed by the Commissioner of the General Land Office.

SEC. 6. That all acts and parts of acts inconsistent with the provisions of this act are hereby repealed.

Land Office Regulations.—The first, second, and third sections provide for the sale of surveyed lands in California, Oregon, Nevada, and in Washington Territory, not yet proclaimed and offered at public sale, valuable chiefly for timber and stone, unfit for cultivation, and consequently for disposal under the pre-emption and homestead laws. When a party applies to purchase a tract thereunder, the Register and Receiver will require him to make affidavit that he is a citizen of the United States by birth or naturalization, or that he has declared his intention to become a citizen under the naturalization laws. If native born, parol evidence of that fact will be received; if not native born, record evidence of the prescribed qualification must be furnished. In connection therewith, he will be required to make the sworn statement in duplicate, according to the attached form, as provided for in the second section of the act. One of the duplicate statements filed in each is by the act required to be transmitted to this office, and the Registers and Receivers will accordingly send up with their monthly returns the duplicate statements to be transmitted for the month.

The evidence in regard to the publication of notice required to be furnished, in the third section of the act, must consist of the affidavit of the publisher or other person having charge of the newspaper in which the notice is published, with a copy of the notice attached thereto, setting forth the nature of his connection with the paper, and that the notice was duly published for the prescribed period. The evidence required in the same section with regard to the non-mineral character of the land, and its unoccupied and unimproved condition, must consist of the testimony of at least two disinterested witnesses, to the effect that they know the facts to which they testify from personal inspection of the land and of each of its smallest legal subdivisions, as per form attached. This testimony may be taken before the Register or Receiver, or any officer using an official seal and authorized to administer oaths in the land district in which the land lies. Upon such proof being produced, if no adverse claim shall have been filed, the entry applied for may be allowed in pursuance of the provisions of the act. The Receiver will issue his receipt for the purchase-money, and the Register his certificate of purchase, numbering the entry in the regular cash series. The Register and Receiver will enter the sale on their books, and make the usual returns therefor to this office, noting on the monthly extracts, opposite the entry, and on the entry papers, a reference to the act of Congress under which allowed. They will forward all the papers in the case with their returns to this office, except the retained duplicate statement filed under the second section of the act, to which the Register will give the same number with the other papers for the entry, and retain it on the appropriate file with the former application in his office.

The Register and Receiver will be entitled to a fee of five dollars each for allowing an entry under said act, and jointly at the rate of twenty-two cents and a half per hundred words for testimony reduced by them to writing for claimants, which will be accounted for as other fees.

If, at the expiration of the sixty days' notice provided for in the third section of the act, an adverse claim should be found to exist calling for an investigation, the Register and Receiver will allow the parties a hearing according to the rules of practice.

In case of an association of persons making application for such an entry, each of the persons must prove the requisite qualifications, and their names must appear in and be subscribed to the sworn statement, as in case of an individual person. They must also unite in the regular application for entry, which will be made in their joint names as in other cases of joint cash entry. The forms prescribed for cases of applications by individual persons may be adapted for use in applications of this class.

Salt and Saline Lands.

ACT OF CONGRESS OF JANUARY 12, 1877.—An Act providing for the sale of saline lands.

Be it enacted, etc., That whenever it shall be made appear to the Register and the Receiver of any land office of the United States that any lands within their district are saline in character, it shall be the duty of said Register and said Receiver, under the regulation of the General Land Office, to take testimony in reference to such lands to ascertain their true character, and to report the same to the General Land Office; and if, upon such testimony, the Commissioner of the General Land Office shall find that such lands are saline and incapable of being purchased under any of the laws of the United States relative to the public domain, then, and in such case, such lands shall be offered for sale by public auction at the local land office of the district in which the same shall be situated, under such regulations as shall be prescribed by the Commissioner of the General Land Office, and sold to the highest bidder for cash at a price not less than one dollar and twenty-five cents per acre; and in case said lands fail to sell when so offered, then the same shall be subject to private sale, at such land office, for cash, at a price not less than one dollar and twenty-five cents per acre, in the same manner as other lands of the United States are sold: *Provided*, That the foregoing enactments shall not apply to any State or Territory which has not had a grant of salines by act of Congress, nor to any State which may have had such a grant, until either the grant has been fully satisfied, or the right of selection thereunder has expired by efflux of time. But nothing in this act shall authorize the sale or conveyance of any title other than such as the United States has, and the patents issued shall be in the form of a release and quit-claim of all title of the United States in such lands.

SEC. 2. That all executive proclamations relating to the sales of public lands shall be published in only one newspaper, the same to be printed and published in the State or Territory where the lands are situated, and to be designated by the Secretary of the Interior.

LAND OFFICE REGULATIONS.—The act provides a mode of proceeding by which public lands indicated by the field-notes of survey, or otherwise, to be *saline in character* may be rendered subject to disposal.

Should *prima facie* evidence that certain tracts are saline in character be filed with the Register and Receiver of the proper land district, they will designate a time for a hearing at their office, and give notice to all parties in interest in order that they may have ample opportunity to be present with their witnesses.

At the hearing the witnesses will be thoroughly examined with regard to the true character of the land, and whether the same contains any known mines of gold, silver, cinnabar, lead, tin, copper, or other valuable mineral deposit, or any deposit of coal.

The witnesses will also be examined in regard to the extent of the saline deposits upon the given tracts, and whether the same are claimed by any person; if so, the names of the claimants, and the extent of their improvements must be shown.

The testimony should also show the agricultural capacities of the land, what kind of crops, if any, have been raised thereon, and the value thereof. The testimony should be as full and complete as possible, and, in addition to the leading points indicated above, everything of importance bearing upon the question of the character of the land should be elicited at the hearing.

The Register and Receiver will transmit the testimony to this office with their joint opinion thereon. When the case comes before this office, such a decision will be rendered in regard to the character of the land as the law and the facts may warrant.

Should the given tracts be adjudged agricultural, they will be subject to disposal as such. Should the tracts be adjudged *saline lands*, the Register and Receiver will be instructed to offer the same for sale, after public notice, at the local land office of the district in which the same shall be situated, and to sell said tract or tracts to the highest bidder for cash, at a price of not less than $1.25 per acre.

In case said lands fail to sell when so offered, the same will be subject to private sale at such land office for cash, at a price of not less than $1.25 per acre, in the same manner as other public lands are sold.

The provisions of this act do not apply to any lands within the Territories, nor to any within the States of Mississippi, Louisiana, Florida, California, and Nevada, none of which have had a grant of salines by act of Congress.

Coal Lands.

UNITED STATES REVISED STATUTES.—SEC. 2347. Every person above the age of twenty-one years, who is a citizen of the United States, or who has declared his intention to become such, or any association of persons severally, qualified as above, shall, upon application to the Register of the proper land office, have the right to enter by legal subdivisions any quantity of vacant coal lands of the United States not otherwise appropriated or reserved by competent authority, not exceeding one hundred and sixty acres to such individual person, or three hundred and twenty acres to such association, upon payment to the Receiver of not less than ten dollars per acre, for such lands where the same shall be situated more than fifteen miles from any completed railroad, and not less than twenty dollars per acre for such lands as shall be within fifteen miles of such road.

SEC. 2348. Any person or association of persons severally qualified as above provided, who have opened and improved, or shall hereafter open and improve any coal mine or mines upon the public lands, and shall be in actual possession of the same, shall be entitled to a preference-right of entry under the preceding section, of the mines so opened and improved: *Provided*, That when any association of not less than four persons, severally qualified as above provided, shall have expended not less than five thousand dollars in working and improving any such mine or mines, such association may enter not exceeding six hundred and forty acres, including such mining improvements.

SEC. 2349. All claims under the preceding section must be presented to the Register of the proper land district within sixty days after the date of actual possession and the commencement of improvements on the land, by the filing of a declaratory statement therefor; but when the township plat is not on file at the date of such improvement, filing must be made within sixty days from the receipt of such plat at the district office, and where the improvements shall have been made prior to the expiration of three months from the third day of March, eighteen hundred and seventy-three, sixty days from the expiration of such three months shall be allowed for the filing of a declaratory statement, and no sale under the provisions of this section shall be allowed until the expiration of six months from the third day of March, eighteen hundred and seventy-three.

SEC. 2350. The three preceding sections shall be held to authorize only one entry by the same person or association of persons; and no association of persons, any member of which shall have taken the benefit of such sections, either as an individual or as a member of any other association, shall enter or hold any other lands under the provisions thereof; and no member of any association which shall have taken the benefit of such section shall enter or hold any other lands under their provisions; and all persons claiming under section twenty-three hundred and forty-eight shall be required to prove their respective rights and pay for the lands filed upon within one year from the time prescribed for filing their respective claims; and upon failure to file the proper notice or to pay for the land within the required period, the same shall be subject to entry by any other qualified applicant.

SEC. 2351. In case of conflicting claims upon coal lands where the improvements shall be commenced after the third day of March, eighteen hundred and seventy-three, priority of possession and improvement, followed by proper filing and continued good faith, shall determine the preference-right to purchase. And also where improvements have already been made prior to the third day of March, eighteen hundred and seventy-three, division of the land claimed may be made by legal subdivisions, to include as near as may be the valuable improvements of the respective parties. The Commissioner of the General Land Office is authorized to issue all needful rules and regulations for carrying into effect the provisions of this and the four preceding sections.

Registers' and Receivers' Fees and Commissions.

UNITED STATES REVISED STATUTES.—SEC. 2238. Registers and Receivers, in addition to their salaries, shall be allowed each the following fees and commissions, namely:

1. A fee of one dollar for each declaratory statement filed and for services in acting on pre-emption claims.

2. A commission of one per centum on all moneys received at each Receiver's office.

3. A commission to be paid by the homestead applicant, at the time of entry, of one per centum on the cash price, as fixed by law, of the land applied for; and a like commission when the claim is finally established, and the certificate therefor issued as the basis of a patent.

4. The same commission on lands entered under any law to encourage the growth of timber on western prairies, as allowed when the like quantity of land is entered with money.

5. For locating military bounty-land warrants, issued since the eleventh day of February, eighteen hundred and forty-seven, and for locating agricultural-college land-scrip, the same commission, to be paid by the holder or assignee of each warrant or scrip, as is allowed for sales of the public lands for cash, at the rate of one dollar and twenty-five cents per acre.

6. A fee, in donation cases, of five dollars for each final certificate for one hundred and sixty acres of land, ten dollars for three hundred and twenty acres, and fifteen dollars for six hundred and forty acres.

7. In the location of lands by States and corporations under grants from Congress for railroads and other purposes (except for agricultural colleges), a fee of one dollar for each final location of one hundred

and sixty acres; to be paid by the State or corporation making such location.

8. A fee of five dollars per diem for superintending public land sales at their respective offices; and, to each Receiver, mileage in going to and returning from depositing the public moneys received by him.

9. A fee of five dollars for filing and acting upon each application for patent or adverse claim filed for mineral lands, to be paid by the respective parties.

10. Registers and Receivers are allowed, jointly, at the rate of fifteen cents per hundred words for testimony reduced by them to writing for claimants, in establishing pre-emption and homestead rights.

11. A like fee is provided in the preceding subdivision, when such writing is done in the land office, in establishing claims for mineral lands.

12. Registers and Receivers in California, Oregon, Washington, Nevada, Colorado, Idaho, New Mexico, Arizona, Utah, Wyoming, and Montana, are each entitled to collect and receive fifty per centum on the fees and commissions provided for in the first, third, and tenth subdivisions of this section.

Lands not Subject to Pre-emption.

SEC. 2258. The following classes of lands, unless otherwise specially provided for by law, shall not be subject to the rights of pre-emption, to wit:

1. Lands included in any reservation by any treaty, law, or proclamation of the President, for any purpose.

2. Lands included within the limits of any incorporated town, or selected as the site of a city or town.

3. Lands actually settled and occupied for purposes of trade and business, and not for agriculture.

4. Lands on which are situated any known salines or mines.

Title to Town-Lots Subject to Mineral Rights.

SEC. 2386. Where mineral veins are possessed, which possession is recognized by local authority, and to the extent so possessed and recognized, the title to town-lots to be acquired shall be subject to such recognized possession and the necessary use thereof; but nothing contained in this section shall be so construed as to recognize any color of title in possessors for mining purposes, as against the United States.

Suits at Law.

ACT OF CONGRESS OF MARCH 3, 1881.—An Act to amend section twenty-three hundred and twenty-six of the Revised Statutes, relating to suits at law affecting the title to mining claims.

Be it enacted, etc., That if, in any action brought pursuant to section twenty-three hundred and twenty-six of the Revised Statutes, title to the ground in controversy shall not be established by either party, the jury shall so find, and judgment shall be entered according to the verdict. In such case costs shall not be allowed to either party, and the claimant shall not proceed in the land office, nor be entitled to a patent for the ground in controversy, until he shall have perfected his title.

Perjury—Penalty Therefor.

SEC. 5392. Every person who, having taken an oath before a competent tribunal, officer, or person, in any case in which a law of the United States authorizes an oath to be administered, that he will testify, declare, depose, or certify truly, or that any written testimony, declaration, deposition, or certificate by him subscribed is true, willfully and contrary to such oath states or subscribes any material matter which he does not believe to be true, is guilty of perjury, and shall be punished by a fine of not more than two thousand dollars, and by imprisonment, at hard labor not more than five years, and shall, moreover, thereafter, be incapable of giving testimony in any court of the United States until such time as the judgment against him is reversed.

Agent—Adverse Claim—Citizenship of Applicant.

ACT OF CONGRESS OF APRIL 26, 1882.—An Act to amend section twenty-three hundred and twenty-six of the Revised Statutes, in regard to mineral lands, and for other purposes.

Be it enacted, etc., That the adverse claim required by section twenty-three hundred and twenty-six of the Revised Statutes may be verified by the oath of any duly authorized agent or attorney-in-fact of the adverse claimant, cognizant of the facts stated, and the adverse claimant, if residing or at the time being beyond the limits of the district wherein the claim is situated, may make oath to the adverse claim before the clerk of any court of record of the United States or of the State or Territory where the adverse claimant may then be, or before any notary public of such State or Territory.

SEC. 2. That applicants for mineral patents, if residing beyond the limits of the district wherein the claim is situated, may make any oath or affidavit required for proof of citizenship before the clerk of any court of record, or before any notary public of any State or Territory. Approved, April 26, 1882.

The above law modifies the rulings on page 38 (Nos. 28, 30, 31) as to adverse claims—also the instructions on page 25, and the ruling on page 47 (No. 6), touching proof of citizenship of applicants for patent.

LAND OFFICE REGULATIONS.—It will be observed that the act is not retroactive, and hence cannot affect proceedings had prior to its approval; where citizenship, however, has not been proven, it may be established as provided by section 2 of this act.

Where an agent or attorney in fact verifies the adverse claim, he must distinctly swear that he is such agent or attorney, and accompany his affidavit by proof thereof.

The agent or attorney in fact must make the affidavit in verification of the adverse claim within the land-district where the claim is situated. Circular of May 9, 1882.

Application for Patent for Placer Claims.

LAND OFFICE REGULATIONS.—1. The first care in recognizing an application for patent upon a placer claim must be exercised in determining the exact classification of the lands. To this end the clearest evidence of which the case is capable should be presented. If the claim be all placer ground that fact must be stated in the application and corroborated by accompanying proofs. If of mixed placers and lodes it should be so set out, with a description of all known lodes situated within the boundaries of the claim. A specific declaration, such as is required by section 2333, Revised Statutes, must be furnished as to each lode intended to be claimed. All other known lodes are, by the silence of the applicant, excluded by law from all claim by him, of whatsoever nature, possessory or otherwise.

2. Section 2395, Revised Statutes (subdivision 7), requires the surveyor to "note in

his field books the true situation of all mines, salt licks, salt springs, and mill seats which come to his knowledge;" also "all water-courses over which the lines he runs may pass." It further requires him to "note the quality of the lands." These descriptive notes are required by subdivision 8 to be incorporated in the plat by the surveyor general.

3. If these duties have been performed, the surveys will furnish a reasonable guide to the district officers and to claimants in prosecuting their applications. But experience has shown that great neglect has resulted from inattention to the law in this respect, and the regular plats are of very little value in the matter. It will, therefore, be required in the future that deputy surveyors shall, at the expense of the parties, make full examination of all placer claims, and duly note the fact as specified in the law, stating the quality and composition of the soil, the kind and amount of timber and other vegetation, the locus and size of streams, and such other matters as may appear upon the surface of the claims. This examination should include the character and extent of all surface and underground workings, whether placer or lode, for mining purposes.

4. In addition to these data, which the law requires to be shown in all cases, the deputy should report with reference to the proximity of centres of trade or residence; also of well-known systems of lode deposit or of individual lodes. He should also report as to the use or adaptability of the claim for placer mining; whether water has been brought upon it in sufficient quantity to mine the same, or whether it can be procured for that purpose; and finally what works or expenditures have been made by the claimant or his grantors for the development of the claim, and their situation and location with respect to the same as applied for.

5. This examination should be reported by the deputy under oath to the surveyor general, and duly corroborated; and a copy of the same should be furnished with the application for patent to the claim, constituting a part thereof, and included in the oath of the applicant.

6. In case of a proposed claim for lands not yet surveyed, the foregoing regulations will govern the application for survey.

7. In controversies hereafter to be determined respecting the mineral value of lands, their value for all purposes, whether agricultural or municipal, or as seats for towns, will be considered, without reference to the decisions heretofore made in particular cases. No decision finally executed, however, will be reconsidered under this modification.

8. No application by an association of persons for patent to a placer claim will be allowed to embrace more than one hundred and sixty acres, nor will any application be entertained that embraces more than one location. (See amended paragraph below.—EDITOR.)

9. Applications awaiting entry, whether published or not, must be made to conform to these regulations, both with respect to amount of ground and examination as to the character of the land. Entries already made will be suspended for examination by the Commissioner, and such additional proofs as may be deemed necessary in each case will be demanded. Circular of Sept. 22, 1882.

8. No application by an association of persons for patent to a placer claim will be allowed to embrace more than one hundred and sixty acres; and not less than five hundred dollars' worth of work must be shown to have been expended upon or for the benefit of each separate location embraced in such application. If an individual becomes the purchaser and possessor of several separate claims of twenty acres each, or less, he may be permitted to include in his application for patent any number of such claims contiguous to each other, not exceeding in the aggregate one hundred and sixty acres;

but upon or for the benefit of each original claim or location so embraced, he or his grantors must have expended the sum of five hundred dollars in improvements. Circular of Dec. 9. 1882. [By letter of January 30, 1883 (10 Land Owner, 210), Secretary Teller ordered that circulars of September 22, and Dec. 9, 1882, should not apply to deposits of borax,soda, sulphur, alumn and asphalt. These deposits can be entered under former instructions.—EDITOR.]

Additional Rules.

LAND OFFICE REGULATIONS.—No application will be received, or entry allowed, which embraces more than one lode location.

2. A party who is not an applicant for patent under section 2325, Revised Statutes, or the assignee of such applicant, is not entitled to make entry under said section, and in no case will the name of such party be inserted in the certificate of entry. This regulation has no reference to proceedings under section 2326.

3. Any party applying to make entry as *trustee* must disclose fully the nature of the trust and the name of the *cestui que trust;* and such trustee, as well as the beneficiaries, must furnish satisfactory proof of citizenship, and the names of the beneficiaries, as well as that of the trustee, must be inserted in the final certificate of entry.

4. Where an adverse claim has been filed and suit thereon commenced within the statutory period, and final judgment determining the right of possession rendered in favor of the applicant, it will not be sufficient for him to file with the Register a certificate of the clerk of the court, setting forth the facts as to such judgment, but he must, before he is allowed to make entry, file a certified copy of the judgment, together with the other evidence required by section 2326, Revised Statutes.

5. Where such suit has been dismissed, a certificate of the clerk of the court to that effect, or a certified copy of the order of dismissal, will be sufficient.

6. In no case will a relinquishment of the ground in controversy, or other proof, filed with the Register or Receiver, be accepted in lieu of the evidence required in paragraphs 4 and 5.

7. Where an adverse claim has been filed, but no suit commenced against the applicant for patent within the statutory period, a certificate to that effect by the clerk of the state court having jurisdiction in the case, and also by the clerk of the circuit court of the United States for the district in which the claim is situated, will be required.

8. Possessory title to a lode claim held and worked for a period equal to the time prescribed by the statute of limitations for mining claims of the State or Territory where the same may be situated, may, in the absence of any adverse claim, be established in the same manner as now allowed in placer claims, and indicated generally in paragraphs 67, 68, and 69 of the circular hereby amended.

9. No entry will be allowed until the Register has satisfied himself by a careful examination, that proper proofs have been filed upon all the points indicated in official regulations in force, and that they show a sufficient *bona fide* compliance with the laws and such regulations. A strict observance of this regulation will be required. Circular of June 8, 1883.

PRACTICAL FORMS.

a. FORMS.

FORM 1.

Notice of Location.

Notice is hereby given that the undersigned, having complied with the requirements of Chapter Six of Title Thirty-two of the Revised Statutes of the United States, and the local customs, laws and regulations, has located ——— linear feet on the ——— lode [twenty acres of placer mining ground], situated in ——— Mining District, ——— County, ———, and described as follows:

[*Describe the claim accurately (by courses and distances, if possible,) with reference to some natural object or permanent monument, and mark the boundaries by suitable monuments; if a placer claim is located on surveyed land, describe the legal subdivision.*]

Discovered ———, 188–. ——— ———, Locator.

Located ———, 188–. Recorded ———, 188–.

Attest:

———

———

NOTE.—Record of location notices, in absence of a District Recorder, should be made with the proper recorder of deeds for the county wherein the claim is situated. It is advisable to have these notices attested by witnesses, for locators cannot be too careful about their evidence.

In re-locations to increase width of surface ground under the local law, or to more particularly identify or describe the claim, use the above form, but state after the description that it is a re-location, and in addition, where the original location is recorded, in order that the title may revert back to the original discovery.

In locations of abandoned mines, the fact that it is such a location should be stated, and the affidavits of two or more respectable parties that such mine was abandoned and subject to re-location, should be recorded with the location notice.

Where the location is by agent, that fact should be stated after the name of the locator, thus: By Thomas Jones, agent (or attorney).

FORM 2.

Proof of Labor.

——— *of* ———, *County of* ———, *ss.*

Before me the subscriber personally appeared ———, who being duly sworn says that at least ——— dollars' worth of labor or improvements were performed or made upon [here describe claim], situated in ——— mining district, ——— county, ——— of ———, during the year ending ———, 188–. Such expenditure was made by or at

the expense of ——— ———, owners of said claim, for the purpose of holding said claim.

[Jurat.] ——— ——— (Signature).

NOTE.—The record of an affidavit like the above is *prima facie* evidence of the performance of such labor.

FORM 3.

Notice of Forefeiture.

——— County, ——— ———, 188–.

To—(names of all parties who have record title to any portion of the mine). You are hereby notified that I have expended ——— dollars in labor and improvements upon the ——— lode (describe the claim), as will appear by certificate filed ———, 188–, in the office of the Recorder of said county (or district), in order to hold said premises under the provisions of section 2324 Revised Statutes of the United States, being the amount required to hold the same for the year ending ———, 188–. And if within ninety days from the service of this notice (or within ninety days after this notice by publication), you fail or refuse to contribute your proportion of such expenditure as a co-owner, your interest in said claim will become the property of the subscriber under said section 2324.

——— ——— (Signature).

NOTE.—At the expiration of 180 days, this notice should be recorded with the affidavit of the newspaper publisher (see Form 13), that the same was published for the period of ninety days, together with the affidavit (Form 4) of the party signing the notice to the effect that one or more of the co-owners named in the published notice have not paid their share of the expenditure. This completes the record title.

FORM 4.

Affidavit of Failure to Contribute.

——— *of* ———, *County of* ———, *ss.*

——— ———, being duly sworn, deposes and says that for the year ending ———, 188–, he expended at least ——— dollars in labor and improvements upon the ——— lode [or ——— placer claim] (here describe the claim), to hold the same under the laws of the United States and of this ——— (district, Territory or State,): that due notice thereof was personally served upon ——— ———, co-owners, on the ——— day of ———, 188–, (or was duly published in the ——— ———, as appears from the affidavit of the publisher thereof): and that ——— ——— (of the said) co-owners have failed or refused to contribute their share of said expenditures within the time required by law.

———.

Subscribed and sworn to before me this ——— day of ———, 188–.

———.

FORM 5.

Miner's Lien.

KNOW ALL MEN BY THESE PRESENTS, That I, ———, of the county of ———, ——— of ———, do hereby give notice of my intention to hold and claim a lien, by virtue of the statute in such case made and provided, upon ——— (describe premises), with all improvements and appurtenances, situated in ——— Mining District, County of ———, ——— of ———.

The said lien being claimed and held for and on account of *work and labor done by me as ——— for ———, owner of said premises* in and upon said premises, from the ——— day of ———, A. D. 188–, to the ——— day of ———, A. D. 188–.

The total value of the said work and labor being ——— dollars, upon which there has been paid the sum of ——— dollars, leaving a balance of ——— dollars still due, owing and unpaid to me, the said claimant.

——— ——— (Signature).

——— *of* ———, *County of* ———, *ss.*

On this ——— day of ———, A. D. 188–, personally appeared before me the above named ———, and who being by me first duly sworn, on ——— oath states that the abstract of indebtedness mentioned and described in the foregoing notice, is true and correct, and that there is still due and owing to ——— from the said ———, for the ——— aforesaid, the sum of ——— dollars and —— cents.

——— ——— (Signature).

Subscribed and sworn to before me this ——— day of ———, A. D, 188–.

(Official signature).

NOTE.—For materials insert "goods furnished and delivered to owners of said premises, for use on said premises, and which were used on said premises." Below, substitute "materials furnished, to wit: Powder, lumber, etc., as per bill annexed" in place of "work and labor."

FORM 6.

Application for Survey.

——— ———, 188–.

To ———, *United States Surveyor-General for* ———:

SIR—In compliance with the provisions of Chapter Six of Title Thirty-two, Revised Statutes of the United States, ——— herewith make application for an official survey of the mining claim known as the ——— mine, claimed by ———, located in ——— Mining District, in the County of ———, Township No. ———, Range No. ———, ——— base and meridian, in the ——— of ———, and ——— request that you will send to ——— address an estimate of the amount to be deposited, for the work to be done in your office; and that after such deposit shall have been made, you will cause the said mining claim to be surveyed by ———, United States Deputy Surveyor at ———.

Respectfully,

——— ———, Claimant.

P. O. Address, ———, ——— county, ———.

NOTE.—Survey is not required when placer-claims embrace legal subdivisions.

FORM 7.

Application for Patent.

———, *County of* ———, *ss.*

APPLICATION FOR PATENT FOR THE ——— ——— MINING CLAIM.

To the Register and Receiver of the U. S. Land Office at ———.

———, being duly sworn according to law, deposes and says, that in virtue of a compliance with the mining rules, regulations and customs, by himself, the said ———, and his co-claimants (residence of each should be stated), ———, applicants for patent herein ha— become the owner of and ——— in the actual, quiet and undisturbed possession of ——— linear feet of the ——— vein, lode or deposit, bearing ———, together with surface ground ——— feet in width, for the convenient working thereof, as allowed by local rules and customs of miners; said mineral claim, vein, lode or deposit and surface ground being situated in the ——— mining district, county of ———, and ——— of ———, and being more particularly set forth and described in the official field notes of survey thereof, hereto attached, dated ——— day of ———, A. D. 188–, and in the official plat of said survey, now posted conspicuously upon said mining claim or premises, a copy of which is filed herewith. Deponent further states that the facts relative to the right of possession of himself (and his said co-claimants hereinbefore named) to said mining claim, vein, lode or deposit and surface ground, so surveyed and platted, are substantially as follows, to wit:

(*Trace the history of the lode fully.*)

Which will more fully appear by reference to the copy of the original record of location and the abstract of title hereto attached and made a part of this affidavit; the value of the labor done and improvements made upon said ——— claim, by himself and his grantors, being equal to the sum of five hundred dollars, and said improvements consist of (*describe fully*). In consideration of which facts, and in conformity with the provisions of Chapter Six of Title Thirty-two of the Revised Statutes of the United States, application is hereby made for and in behalf of said ——— for a patent from the Government of the United States for the said ——— mining claim, vein, lode, deposit, and the surface ground so officially surveyed and platted.

——— ———.

Subscribed and sworn to before me this ——— day of ———, A. D. 188–, and I hereby certify that I consider the above deponent a credible and reliable person, and that the foregoing affidavit, to which was attached the field notes of survey of the ——— mining claim, was read and examined by him before his signature was affixed thereto and the oath made by him.

(Official Signature.)

NOTE.—The above is slightly changed in applying for placer-mines.

FORM 8.

Proof of Posting Notice and Diagram on the Claim.

——— *of* ———, *County of* ———, *ss.*

——— and ———, each for himself, and not one for the other, being first duly sworn according to law, deposes and says, that he is a citizen of the United States, over the age of twenty-one years, and was present on the ——— day of ———, A. D. 188–, when a plat representing the ———, and certified to as correct by the United States Surveyor-General of ———, and designated by him as lot No. ———, together with a notice of the intention of ——— and ——— to apply for a patent for the mining claim and premises so platted, was posted in a conspicuous place upon said mining claim, to wit: Upon ———, where the same could be easily seen and examined; the notice so conspicuously posted upon said claim being in words and figures as follows, to wit:

NOTICE OF THE APPLICATION OF ——— AND ——— FOR A UNITED STATES PATENT.

Notice is hereby given that in pursuance of Chapter Six of Title Thirty-two of the Revised Statutes of the United States, ——— and ———, claiming ——— linear feet of the ——— vein, lode or mineral deposit, bearing ———, with surface ground ——— feet in width, lying and being situated within the ——— mining district, county of ———, and ——— of ———, ha– made application to the United States for a patent for the said mining claim, which is more fully described as to metes and bounds by the official plat herewith posted and by the field notes of survey thereof, now filed in the office of the Register of the District of Lands, subject to sale at ———, which field notes of survey describe the boundaries and extent of said claim on the surface, with magnetic variation at ——— east, as follows, to wit:

(*Full description by courses and distances.*)

the said mining claim being of record in the office of the Recorder of ———, at ———, in the county and ——— aforesaid, the presumed general course or direction of the said ——— vein, lode or mineral deposit being shown upon the plat posted herewith, as near as can be determined from present developments; this claim being for ——— linear feet thereof, together with the surface ground shown upon the official plat posted herewith, the said vein, lode and mining premises hereby sought to be patented being bounded on the ——— by the ——— mining claim.

Any and all persons claiming adversely the mining ground, vein, lode, premises, or any portion thereof so described, surveyed, platted and applied for, are hereby notified that unless their adverse claims are duly filed as according to law and the regulations thereunder within sixty days from the date hereof, with the Register of the United States Land Office at ———, in the ——— of ———, they will be barred, in virtue of the provisions of said statute.

——— ——— (Names of applicants.)

Dated on the ground this ——— day of ———, A. D. 188–.

Witness: (Names of witnesses.) ———. ———.

Subscribed and sworn to before me this ——— day of ———, A. D. 188–, and I hereby certify that I consider the above deponents credible and reliable witnesses, and that the foregoing affidavit and notice were read by each of them before their signatures were affixed thereto and the oath made by them.

———.

NOTE.—The notice to be posted on the claim with the plat is given in the above form.

FORM 9.

Proof that Plat and Notice Remained Posted on Claim During Period of Publication.

——— *of* ———, *County of* ———, *ss.*

———,being first duly sworn according to law, deposes and says, that he is claimant (and co-owner with ———) in the ——— mining claim, ——— mining district, ——— county, the official plat of which premises, designated by the Surveyor-General as lot No. ———, together with the notice of intention to apply for a patent therefor, was posted thereon, on the ——— day of ———, A. D. 188–, as fully set forth and described in the affidavit of ——— and ———, dated the ——— day of ———, A. D. 188–, which affidavit was duly filed in the office of the Register at ——— in this case; and that the plat and notice so mentioned and described, remained continuously and conspicuously posted upon said mining claim from the ——— day of ———, A. D. 188–, until and including the ——— day of ——— ———, A. D. 188–, including the sixty days period during which notice of said application for patent was published in the newspaper.

[Jurat.] ———.

(One of the applicants.)

FORM 10.

Register's Certificate of Posting Notice for Sixty Days.

United States Land Office, at ———, ———, 188–.

I hereby certify that the official plat of the ——— lode designated by the Surveyor-General as lot No. ——— was filed in this office on the ——— day of ———, A. D. 188–, and that the attached notice of the intention of ——— to apply for a patent for the mining claim or premises embraced by said plat, and described in the field notes of survey thereof filed in said application, was posted conspicuously in this office on the ——— day of ———, A. D. 188–, and remained so posted until the ——— day of ———, A. D. 188–, being the full period of sixty consecutive days during the period of publication as required by law; and that said plat remained in this office during that time, subject to examination, and that no adverse claim thereto has been filed.

———, *Register.*

NOTE.—The notice posted in the office should be attached to this certificate; a copy of the notice published is the one usually posted in the Register's office.

FORM 11.

Notice for Publication in Newspaper.

Mining Application No. ——.

United States Land Office, ——— ———, ———, 188–.

Notice is hereby given that ———, whose post office address is ———, has this day filed his application for a patent for ——— linear feet of the ——— mine or vein bearing ———, with surface ground ——— feet in width, situated in ——— mining district, county of ———, and ——— of ———, and designated by the field notes and official plat on file in this office as lot No. ———, in township ———, range ———, of ——— meridian, ———. Said lot No. ——— being described as follows, to wit: Beginning at, etc.

Magnetic variation ———, containing ——— acres.

The location of this mine is recorded in the Recorder's office of ———, in book ——— of ———. The adjoining claimants are ———.

Any and all persons claiming adversely any portion of said ——— mine or surface ground are required to file their adverse claims with the Register of the United States Land Office at ———, in the ——— of ———, during the sixty days period of publication hereof, or they will be barred by virtue of the provisions of the statute.

——— ———, *Register.*

FORM 12.

Agreement of Publisher.

The undersigned, publisher and proprietor of the ———, a ——— newspaper, published at ———, county of ———, and ——— of ———, does hereby agree to publish a notice, dated United States Land Office, ———, required by Chapter Six of Title Thirty-two, Revised Statutes of the United States, of the intention of ——— to apply for a patent for his claim on the ——— lode, situated in ——— mining district, county of ———, of ———, and to hold the said ——— alone responsible for the amount due for publishing the same. And it is hereby expressly stipulated and agreed that no claim shall be made against the Government of the United States, or its officers or agents, for such publication.

Witness my hand and seal this ——— day of ———, A. D. 188–.

Witness: ——— ———.

———.

FORM 13.

Proof of Publication.

——— *of* ———, *County of* ———, *ss.*

Reprint Copy of / Notice of Application. } ———, being first duly sworn, deposes and says, that he is the ——— of the ———, a newspaper published at ———, in ——— county, in the ——— of ———; that the notice of the application for a patent for the ——— mining claim, of which a copy is hereto attached, was first published in said newspaper, in its issue dated the ——— of ———, 188–, and was published in each [daily or weekly] issue of said newspaper for [sixty consecutive days, or nine consecutive weeks,] thereafter, the full period of sixty days, the last publication thereof being in the issue dated the ——— of ———, 188–.

——— ———.

Subscribed and sworn to before me this ——— day of ———, A. D. 188–.

[SEAL.] ——— ———, *Notary Public.*

FORM 14.

Affidavit of Five Hundred Dollars Improvement.

——— *of* ———, *County of* ———, *ss.*

——— and ———, of lawful age, being first duly sworn according to law, depos and say that they are acquainted with the ——— mining claim in ——— mining district, county and ——— aforesaid, for which ——— has made application for patent under the provisions of Chapter Six of Title Thirty-two, Revised Statutes of the United States and that the labor done and improvements made thereon by the applicant and his grantors exceed five hundred dollars in value, and said improvements consist of (describe fully).

——— ———.

Subscribed and sworn to before me this ——— day of ———, A. D. 188–.

——— ———.

FORM 15.

Statement of Fees and Charges.

——— *of* ———, *County of* ———, *ss.*

———, being first duly sworn according to law, deposes and says that he is the applicant for patent for the ——— lode in ——— mining district, county of ———, ——— of ———, under the provisions of Chapter Six of Title Thirty-two of the Revised Statutes of the United States, and that in the prosecution of said application he has paid out the following amounts, and no more, viz.: To the credit of the Surveyor-General's office, ——— dollars; for surveying, ——— dollars; for filing in the local land office, ——— dollars; for publication of notice, ——— dollars; and for the land embraced in his claim, ——— dollars.

——— ———.

Subscribed and sworn to before me this ——— day of ———, A. D. 188–.

[SEAL.] ——— ———, *Notary Public.*

FORM 16.

Proof of Ownership and Possession in Case of Loss or Absence of Mining Records.

——— *of* ———, *County of* ———, *ss.*

——— ———, and ——— ———, each for himself, and not one for the other, being first duly sworn according to law, deposes and says that he is a citizen of the United States, over the age of twenty-one years, and a resident of ——— county, ———, and has resided in ——— mining district, wherein the ——— mine is situated, since ——— day of ———, 18—. That since said date he has been acquainted with the ——— mine, and with the possessors and workers thereof. That said mine was located and has been possessed and worked in accordance with the customs and usages of miners in said district, and in conformity with the rules and regulations governing the location, holding and working of mining claims, in force and observed in the (State) of ———. That there are no written records known to deponent existing in said mining district. That affiant is credibly informed and believes that the ——— mine was located in the year 18—, and that if any record was made of said location, and of the names of locators, the same has not been in existence for a long number of years past, and that by reason thereof the names of locators cannot now be ascertained, and no abstract of title from locators to the present owner can be made. That the possession of applicant and his predecessors in interest of said ——— mine has been actual, notorious and continuous, to the positive knowledge of deponent, since his residence in said mining district, and that such possession has been perfected and maintained in conformity with mining usages and customs, and has been acquiesced in and respected

by the miners of said district. That applicant's right to the said ——— mine is not in litigation within the knowledge of affiant, and that no action or actions have been commenced affecting the right to said mine since his acquaintance therewith (and that the time for the commencement thereof, as required to be instituted under the provisions of the Statute of Limitations of the ——— of ———, has long since elapsed). That applicant and his predecessors in interest have expended in the improvement, development and working of said mine a sum of money exceeding ——— dollars, as follows, to wit: ———.

——— ———.
——— ———.
——— ———.

Subscribed and sworn to before me this ——— day of ———, A. D. 188–, and I certify that the aforenamed ——— and ——— are credible and respectable persons, to whose affidavits full faith and credit should be given.

[SEAL.] ——— ———.

NOTE.—This should be sworn to by at least two respectable persons.

FORM 17.

Affidavit of Citizenship.

——— *of* ———, *County of* ———, *ss.*

———, being first duly sworn according to law, deposes and says, that he is the applicant for patent for ——— mining claim, situated in ——— mining district, county of ———; that he is a native-born citizen of the United States, born in ———, county of ———, State of ———, in the year 18—, and is now a resident of ———.

——— ———.

Subscribed and sworn to before me this ——— day of ———, A. D. 188–.

——— ———.

NOTE.—If the applicant is a naturalized citizen, or has declared his intention to become a citizen, he should show in his affidavit where, when and before what court he was naturalized or his declaration was made.

FORM 18.

Certificate that No Suit is Pending.

——— *of* ———, *County of* ———, *ss.*

I, ———, clerk of the court in and for ——— county, ———, do hereby certify that there is now no suit or action of any character pending in said court involving the right of possession to any portion of ——— mining claim, and that there has been no litigation before said court affecting the title to said claim, or any part thereof, for ——— years last past, other than what has been finally decided in favor of ———.

In witness whereof, I have hereunto set my hand and affixed the seal of said court, at my office in ———, this ——— day of ———, A. D. 188–.

[SEAL.] ——— ———, Clerk of the ——— Court, ———.

FORM 19.

Power of Attorney to Apply for Patent.

KNOW ALL MEN BY THESE PRESENTS, that we, ——— and ———, do hereby constitute and appoint ——— as our attorney in fact, for us and in our names, to make application to the United States for the entry and purchase of certain Government lands, in ——— mining district, ——— county, ——— of ———, known as the ——— mining claim and premises; and to have the same surveyed, and to take any and all steps that may be necessary to procure from the Government of the United States a patent to

the said lands and premises, granting the same to us. And to do all other acts appertaining to the said survey and entry aforesaid as we ourselves could do by our own act and in our own proper person.

In witness whereof we have hereunto set our hands and affixed our seals the ——— day of ———, A. D. 188–.

———.
———.

——— *of* ———, *County of* ———, *ss.*

On this ——— day of ———, A. D. 188–, before me, ———, a Notary Public in and for the ———, county of ———, personally appeared ———, known to me to be the same person whose name ——— subscribed to the foregoing instrument, and acknowledged to me that ——— executed the same.

In witness whereof I have hereunto set my hand and affixed my official seal at my office, the day and year in this certificate first above written.

[SEAL.] ——— ———, *Notary Public.*

FORM 20.

Proof that no Known Vein Exists in a Placer Mining Claim.

——— *of* ———, *County of* ———, *ss.*

——— and ———, of the said county and ———, being first duly sworn, each for himself, deposes and says, that he is well acquainted with the ——— placer mining claim, embracing ——— ———, situated in the ——— mining district, in the county of ———, and ——— of ———, owned and worked by ———, applicant for United States patent; that for many years he has resided near, and often been upon the said mining premises, and that no known vein or veins of quartz or other rock in place, bearing gold, silver, cinnabar, lead, tin or copper, exist on said mining claim, or on any part thereof, so far as he knows, and he verily believes that none exist thereon. And further, that he has no interest whatever in the said placer-mine of ———.

———.

Subscribed and sworn to before me this ——— day of ———, A. D. 188–.

———.

NOTE.—In case any known mines exist within the exterior boundaries of the placer-claim, the names of such known veins should be given.

FORM 21.

Protest and Adverse Claim.

United States Land Office, ——— of ———.

In the matter of the application of ———, for a United States patent for the ——— lode or mining claim and the land and premises appertaining to said mine, situated in the ——— mining district, in ——— county, ——— of ———.

To the Register and Receiver of the United States Land Office at ———, and to the above-named applicants for patent for the ——— lode

You are hereby notified that ——— of the city of ———, county of ———, and ——— of ———, and a citizen of the United States of America, is the lawful owner, and entitled to the possession of ——— hundred feet of the said —— — lode or mine described in said application, as shown by the diagram posted on said claim, and the copy thereof filed in the land office with said application, and as such owner this contestant, the said ———, does protest against the issuing of a patent thereon to said applicant, and does dispute and contest the right of said applicant therefor.

And this contestant does present the nature of his adverse claim, and does fully set forth the same in the affidavit hereto attached, marked Exhibit A, and the further exhibits thereto attached, and made part of said affidavit.

The said ——— therefore respectfully asks the said Register and Receiver that all further proceedings in the matter be stayed, until a final settlement and adjudication of the rights of this contestant can be had in a court of competent jurisdiction.

(Place and Date.) ——— ———.

EXHIBIT A.

——— *of* ———, *County of* ———, *ss.*

———, being first duly sworn, deposes and says, that he is a citizen of the United States, born in the State of ———, and is now residing in ———; that he is the contestant and protestant named in, and who subscribed the notice and protest hereto annexed. Affiant further says that he is the owner by purchase and in the possession of the (adverse) lode or vein of quartz and other rock in place, bearing ——— and other metals. That the said lode is situated in the ——— mining district, ——— county, ——— of ———.

[*The history of the lode should be given in full; for instance, as follows:*]

This affiant further says, that on the day of location the premises hereinafter described were mineral lands of the public domain, and entirely vacant and unoccupied, and were not owned, held, or claimed by any person or persons as mining ground or otherwise, and that while the same were so vacant and unoccupied, and unclaimed, to wit:

On the ——— ——— day of ——— ———, 18—, (name locators,) each and all of them being citizens of the United States, entered upon and explored the premises, discovered and located the said ——— ——— lode, and occupied the same as mining claims. That the said premises so located and appropriated consist of ——— ——— feet in a ———erly direction, and ——— ——— ——— feet in a ———erly direction, as will fully appear by reference to the notice of location, a duly certified copy whereof is hereunto annexed, marked Exhibit B, and hereby made a part of this affidavit. That the locators, after the discovery of the said ——— lode, drove a stake on said lode on the discovery claim, erected a monument of stone around said stake, and placed thereon a written notice of location describing the claim so located and appropriated, giving the names of the locators and quantity taken by each, and after doing all the acts and performing all the labor required by the laws and regulations of said ——— mining district and territory of ———, the locators of said lode caused said notice to be filed and recorded in the proper books of record in the Recorder's office in said district on the ——— day of ———, 18—.

Affiant further says, that the said locators remained continuously in possession of said lode, working upon the same, and within ——— months from the date of said location had done and performed work and labor on said location in mining thereon and developing the same, more than ——— days work, and expended on said location more than ———hundred dollars, and by said labor and money expended upon the said mining location and claim, had developed the same and extracted therefrom more than ——— tons of ore.

And affiant further says, that said locators, in all respects, complied with every custom, rule, regulation, and requirement of the mining laws, and every rule and custom established and in force in said ——— mining district, and thereby became and were owners (except as against the paramount title of the United States) and the rightful possessors of said mining claims and premises.

And this affiant further says, that said locators proved and established to the satisfaction of the Recorder of said ——— mining district that they had fully complied with all the rules, customs, regulations, and requirements of the laws of said district, and thereupon the said Recorder issued to the locators of said ——— lode, certificates confirming their titles and rights to said premises.

That the said lode was located and worked by the said locators as tenants in common, and they so continued in the rightful and undisputed possession thereof from the time of said location until on or about the ——— day of ———, A. D. 18—, at which time the said locators and owners of said lode formed and organized under the laws of the State (or Territory) of ———, and incorporated under the name of the "———," and on the ——— day of ———, A. D. 18—, each of the locators of said lode conveyed said lode and each of their rights, titles, and interest in and to said lode, to said "——— mining company."

On the said ——— day of ———, 18—, the said company entered into and upon said ——— lode, and was seized and possessed thereof and every part and parcel of the same, and occupied and mined thereon until the ——— day of ———, 18—, at which time the said ——— mining company sold and conveyed the same to this affiant, which said several transfers and conveyances will fully appear, by reference to the abstract of title and paper hereto attached, marked Exhibit D, and made a part of this affidavit.

[*In case of individual transfers.*]

And this affiant further says, that the said ———, who located claim ——— northwesterly of the said ——— lode, and the said ———, who located claim ——— northwesterly thereon, was seized and in possession of said claims, and occupied and mined thereon until the ——— day of ———, 18—, at which time the said ——— and ——— sold and conveyed the same to ———, and thereupon the said ——— was seized and possessed of said mining claims and locations, and occupied and mined thereon until the ——— day of ———, 18—, at which time the said ——— sold and conveyed the same to this affiant, as will fully appear by reference to the abstract of title and paper hereto attached, marked Exhibit D, and which this affiant hereby makes a part of this his affidavit.

Affiant further says, that he is now and has been in the occupation and possession of the said ——— lode since the ——— day of ———, 18—, and that said lode and mining claims were located, and the title thereto established, several ——— before said (applied for) ——— lode was located.

Affiant further says, that said ——— lode, as shown by the notice and diagram posted on said claim, and the copy thereof filed in the United States Land Office at said ——— with said application for a patent, crosses and overlaps said ——— lode, and embraces about ——— hundred feet in length by ——— hundred feet in width of the said ——— lode, the property of this affiant, as fully appears by reference to the diagram or map duly certified by ———, United States Deputy Surveyor, hereto attached, marked Exhibit C, and which diagram presents a correct description of the relative locations of the said (adverse) lode, and of the pretended (applied for) lode.

Affiant further says, that he is informed and believes that said applicant for patent well knew that affiant was the owner in possession and entitled to the possession of so much of said mining ground embraced within the survey and diagram of said applications, as is hereinbefore stated, and that this affiant is entitled to all the ———and other metal in said (adverse) lode, and all that may be contained within a space of ——— feet on each side of said (adverse) lode.

And affiant further says, that this protest is made in entire good faith, and with the sole object of protecting the legal rights and property of this affiant in the said (adverse) lode and mining premises.

——— ———.

Subscribed and sworn to before me this ——— day of ———, A. D. 188–.

——— ———.

SURVEYOR'S CERTIFICATE.

On the diagram marked Exhibit C, the Surveyor must certify in effect, as follows:

I hereby certify that the above diagram correctly represents the conflict claimed to exist between the ——— and ——— lodes, as actually surveyed by me. And I further certify, that the value of the labor and improvements on the (adverse) lode, exceeds five hundred dollars, and said improvements consist of (state in full).

(Place and Date.)

——— ———, *U. S. Deputy Surveyor.*

FORM 22.*

Tunnel Claim—Location Certificate.

Know all men by these presents, that the undersigned, citizens of the United States, have this ——— day of ———, 188–, claimed by right of location, a tunnel claim, for the purpose of discovering and working veins, lodes or deposits on the line thereof [cutting the ——— lode, and working the ——— lode]. Said tunnel claim is situated in the ——— mining district, county of ———, State of ———, and the location and bounds of said tunnel are staked on the surface at the place of commencement and termination thereof, as well as along the line thereof. Said claim is more particularly described as follows: [*Describe the commencement and termination by reference to natural objects and permanent monuments, and the line by courses and distances.*]

Dated ———, 188–. ——— ———,

Locator.

FORM 23.

Power of Attorney to Locate and Sell.

Know all men by these presents, that we, the undersigned [*names*], ———, citizens of the United States, have made, constituted and appointed A. B. [*some third person, who will locate and stake*], our true and lawful attorney for us, and in our names to locate, stake and record for us each lode claims and placer mining ground in the ———, ——— county, ——— of ———, and having located the same, to bargain, sell, grant, release and convey the same, entire or in separate parcels, to make proper deeds, seal, acknowledge and deliver the same to such persons as our attorney may desire; hereby ratifying and confirming all lawful acts done by our said attorney by virtue hereof.

Witness our hands and seals, this ——— day of ———, 18—.

[*Names.*]

——— *of* ———, *County of* ———, *ss.*

On this ——— day of ———, 18—, before me ——— in and for the county and State aforesaid, appeared ——— personally known to me as the persons whose names are subscribed to the foregoing power of attorney, and acknowledged the execution thereof as their free act and deed, for the purposes therein mentioned.

Given under my hand and ——— seal the day and year above written.

——— ———.

FORM 24.

Notice of Right to Water.

The undersigned claims the water running in this ——— stream to the extent of ——— inches for mining purposes, to be conveyed by (ditch or flume) from this point to the ——— placer claim.

Dated ———, 18—. ——— ———,

Locator.

NOTE—This notice is to be posted near the outlet, and the following form is to be duly recorded in the district or county Recorder's office.

* Forms 22, 23, 24, 25, 26, 27, and 28, are from Carpenter's Mining Code, slightly modified.

FORM 25.

Pre-emption of Right of Way for Ditch and Location of Water.

To whom these presents may concern, know ye, that I, ———, of the county of ———, in the State of ———, a citizen of the United States, do hereby declare and publish as a legal notice to all the world, that I claim, and have a valid right to the occupation, possession and enjoyment of all and singular, that tract or pareel of land lying and being in the county of ———, in the State of ———, for the exclusive right of way for the purpose of constructing a flume or water ditch from ——— stream to ——— placer claim, more particularly described as follows: Commencing [*here describe the exact route for ditch or flume.*]

I also claim, and have a valid right to the enjoyment and use of ——— inches of water from said stream for mining purposes, to be conveyed through such flume or water ditch to said claim, together with all and singular, the hereditaments and appurtenances thereunto belonging, or in any wise appertaining.

Witness my hand and seal this ——— day of ———, A. D. 18—.

——— ———.

[*Name.*]

Notice posted on the stream ———, 18—.

Ditch commenced at claim or at stream ———, 18—.

——— *of* ———, *County of* ———, *ss.*

On this ——— day of ———, 18—, before me, a ——— in and for the county aforesaid, in the State aforesaid, personally appeared ———, to me personally known to be the person who executed the foregoing written instrument, and acknowledged that he executed the same for the uses and purposes therein set forth.

Witness my hand and official seal. ——— ———.

FORM 26.

Mining Deed.

THIS INDENTURE, made the ——— day of ———, in the year of our Lord one thousand eight hundred and eighty, between ——— ———, of the county of ———, and ——— of ———, party of the first, and ——— ———, of the county of ———, and ——— of ———, party of the second part;

Witnesseth, That the said party of the first part, for and in consideration of the sum of ——— dollars, lawful money of the United States of America, to him in hand paid by the said party of the second part, the receipt whereof is hereby acknowledged, hath granted, bargained, sold, remised, released, and forever quit-claimed, and by these presents does grant, bargain, sell, remise, release, and forever quit-claim, unto the said party of the second part, his heirs and assigns, the ——— lode, as located, surveyed, recorded, and held by said party of the first part, situated in ——— mining district, ——— county, ———, together with all the dips, spurs, and angles, and also all the metals, ores, gold and silver-bearing quartz, rock and earth therein, and all the rights, privileges, and franchises thereto incident, appendant and appurtenant, or therewith usually had and enjoyed; and also, all and singular the tenements, hereditaments, and appurtenances thereunto belonging, or in any wise appertaining, and the rents, issues, and profits thereof; and also, all the estate, right, title, interest, property, possession, claim and demand whatsoever, as well in law as in equity, of the said party of the first part, of, in or to the said premises, and every part and parcel thereof, with the appurtenances.

To have and to hold, all and singular, the said premises, together with the appurtenances and privileges thereto incident, unto the said party of the second part, his heirs

and assigns forever. In witness whereof, the said party of the first part has hereunto set his hand and seal the day and year first above written.

[SEAL.] ——— ———.

——— *of* ———, ———*County, ss.*

I, Richard Roe, a Notary Public in and for said county, in the State aforesaid, do hereby certify that ——— ———, personally known to me to be the person whose name is subscribed to the annexed deed, appeared before me this day in person, and acknowledged that he signed, sealed and delivered the said instrument of writing as his free and voluntary act, for the uses and purposes therein set forth.

Given under my hand and official seal, this ——— day of ———, A. D. 188–.

[SEAL.] RICHARD ROE, *Notary Public.*

FORM 27.

Title Bond to Mining Property.

Know all men by these presents, that I, John W. Newton, party of the first part, of the county of Lake, and State of Colorado, am held and firmly bound unto William H. Hunt, party of the second part, of the county of Lake, and State of Colorado, in the penal sum of ten thousand dollars, lawful money of the United States, to the payment of which the party of the first part hereby binds himself, his heirs, executors, and administrators. Witness his hand and seal this 20th day of July, 1880. The conditions of the foregoing obligations are such, that whereas, the above bounden party of the first part, in consideration of the sum of five dollars, in hand paid, has, on the day and year aforesaid, agreed to sell to the party of the second part the following described mining property, viz: An undivided one-eighth interest in and to the Gilt Edge lode claim, as located, surveyed, recorded, and held, situate, lying and being in California Mining District, Lake county, Colorado, together with all and singular, the improvements, hereditaments, and appurtenances thereto belonging, or in any wise appertaining, for the sum of five thousand dollars, to be paid at the times and in the manner following, viz: One thousand dollars on or before August 20, 1880; one thousand dollars on or before September 20, 1880; and three thousand dollars on or before October 20, 1880; which sums of money are to be paid to the party of the first part, in person, or by depositing the same to his credit at the Vermont National Bank of St. Albans, at the times aforesaid, and time shall be of the essence of these conditions. And in case of failure of the party of the second part, or his assigns, to make either of said payments at the times mentioned, such sum or sums as may have been paid hereunder, shall be forfeited to and retained by the party of the first part, as a penalty and for liquidated damages, and notice of forfeiture is hereby expressly waived, and also all right, demand or claim for the balance or any of said sum of five thousand dollars, is hereby expressly waived by the party of the first part. The party of the first part, his heirs, executors, administrators, and assigns, shall on the 20th day of October, 1880, or at any time before, upon payment of said sums of money hereinbefore mentioned, make, execute, and deliver to the party of the second part, or to such person or persons as he shall designate, good and sufficient deed or deeds of all of the above described property, conveying a clear and perfect title (except the fee simple title of the United States), free from all incumbrances, with a covenant, that the annual expenditure has been made thereon as required by law. Now, if the party of the second part shall fail to pay the sum or sums of money as hereinbefore provided, and if the party of the first part shall faithfully perform the covenants herein set forth, then this obligation shall be null and void; otherwise, to be and remain in full force and effect.

[SEAL.] JOHN W. NEWTON.

State of Colorado, Lake county, ss.

Be it known, That on this 20th day of July, 1880, before me, personally came John

W. Newton, to me known as the person described in, and who executed the foregoing instrument in writing, and acknowledged the execution thereof to be his free act a d deed, for the uses and purposes therein mentioned.

Witness my hand and official seal.

[SEAL.] ALEX. G. WATSON, *Notary Public.*

FORM 28.

Escrow Agreement.

The inclosed deed of the ——— lode is hereby placed in the ——— Bank of ———, *in escrow.* If A. B. shall place, or cause to be placed to the credit of C. D. and E. F., in said ——— bank of ———, on or before ———, 188–, the full sum of ——— dollars, then and in that case the said bank is hereby authorized to deliver the inclosed deed to A. B., or his order. In case the said A. B. shall not place, or cause to be placed, to the credit of said C. D. and E. F., in said bank, the full sum of ——— dollars, on or before ———, 188–, then the said bank is hereby authorized to deliver the inclosed deed to the said C. D. and E. F., or their joint order.

(Signed) C. D.
E. F.
A. B.

——— ——— ———, 188–, (Place and date).

NOTE.—When the option for the purchase of a mine is desired by a third party, it is the safest and best plan for the mine owner to put a deed *in escrow.* It saves incumbering of the record, and any questions that might arise concerning the payment of money. The deed should be a warranty, quit-claim, or mining deed, as agreed, fully executed and acknowledged, ready for delivery, put in a sealed envelope, and placed in some bank, or left with some responsible person, with an agreement written upon the envelope, as above.

FORM 29.

Mining Lease.*

THIS INDENTURE, made this ——— day of ———, in the year of our Lord c e thousand eight hundred and eighty ——, between ——— lessor and ——— lessee or tenant; *Witnesseth,* That the said lessor for and in consideration of the rents, royalties, covenants and agreements hereinafter reserved, and by the said lessee to be paid, kept and performed, ——— granted, demised and let, and by these presents do grant, demise and let unto the said lessee, all the following described mine and mining property, situated in ——— mining district, county of ———, ——— of ———, to wit: (Here description of property.) Together with the appurtenances ——— to have and to hold unto the said lessee or tenant for the term of ——— from the date hereof, expiring at noon on the ——— day of ———, A. D. 188–, unless sooner forfeited or determined through the violation of any covenant hereinafter against the said tenant ——— reserved.

And in consideration of the said demise, the said lessee does covenant and agree with said lessor as follows, to wit:

To enter upon said mine or premises and work the same mine fashion, in manner necessary to good and economical mining, so as to take out the greatest amount of ore possible, with due regard to the safety, development and preservation of the said premises as a workable mine.

(Here insert special covenants for dead work, etc.)

* From Morrison's Mining Rights in Colorado.

NOTE.—The covenants of a mining lease are peculiar, and cannot be too particularly stated in the instrument. If for more than one year, it should be in writing, and recorded.

Instead of a lease a license may be granted. The distinctions between a lease and a license are technical, but important.

A license, usually, is not exclusive, and invests no property in the mineral until severed. Work done for lessees cannot subject the ground to a miner's lien.

To work and mine said premises as aforesaid steadily and continuously from the date of this lease: and that any failure to work said premises with at least ——— persons employed underground for the space of ——— consecutive days may be considered a violation of this covenant.

To well and sufficiently timber said mine at all points where proper, in accordance with good mining; and to repair all old timbering wherever it may become necessary.

To allow said lessor and ——— agents to enter upon and into all parts of said mine for the purpose of inspection, with use of all passages, ropes, windlass, ladder-ways, and all other means of ingress and egress for such purpose.

To not assign this lease, or any interest thereunder, and to not sublet the said premises or any part thereof, without the written assent of said lessor, and to not allow any person or persons except the said lessee and ——— workmen to take or hold possession of said premises or any part thereof under any pretence whatever.

To occupy and hold all cross or parallel lodes, dips, spurs, feeders, crevices or mineral deposits of any kind, which may be discovered in working under this lease, or in any tunnel run to intersect said ——— lode, or by the said lessee or any person or persons under ———, in any manner at any point within ——— feet of the centre line of said lode, as the property of said lessor; with privilege to said lessee of working the same as an appurtenance of said demised premises, during the term of this lease; and to not locate or record the same, or allow the same to be located or recorded, except in the name of said lessor.

To keep at all times the drifts, shafts, tunnels, and other passages and workings of said demised premises, thoroughly drained and clear of loose rock and rubbish of all kinds.

To pay and deliver to said lessor as royalty, ——— of all ore to be extracted from said premises during said term, of like assay to that retained by said lessee, delivered at ——— as soon as mined, without offset, deduction, or charge whatever, except lessor's proportion for packing.

To deliver up to said lessor the said premises, with the appurtenances and all improvements ——— in good order and condition, with all shafts and tunnels and other passages thoroughly clear of rubbish and drained, and the mine in all points ready for immediate continued working (accidents not arising from negligence alone excusing), without demand or further notice, on said ——— day of ———, A. D. 188–, at noon or at any time previous, upon demand for forfeiture.

And finally, upon the violation by said lessee, or any person under ———, of any covenant or covenants hereinbefore reserved, the term of this lease shall, at the option of said lessor, expire, and the same and said premises with the appurtenances shall become forfeit to said lessor: and said lessor or ——— agent may thereupon, after demand of possession in writing, enter upon said premises and dispossess all persons occupying the same, with or without force, and with or without process of law; or at the option of said lessor, the said tenant and all persons found in occupation may be proceeded against as trespassers from the beginning of said term both as to realty and the ore served therefrom; or as guilty of unlawful detainer.

Each and every clause and covenant of this Indenture shall extend to the heirs, executors, and administrators of all parties hereto: and to the assigns of said lessor: and as said lessor may elect, to the assigns of said lessee.

In witness whereof, The said parties, lessor and lessee, have hereunto set their hands and seals.

——— ———. ——— ———. [SEAL.]

——— ———. ——— ———. [SEAL.]

STATE AND TERRITORIAL MINING LAWS.

ARIZONA.

Location and Registry.

An Act providing for the location and registration of Mines and Mineral Deposits, and for other purposes.

SECTION 1.—**Mining Districts.**—The mining districts heretofore created in the several counties of this territory are hereby authorized and empowered to make all necessary rules and regulations for the location, registry, and working of mines therein: *Provided*, That all locations and registrations of mines and mineral deposits hereafter made in any of the said districts shall be transmitted to the county recorder for record, within sixty days after the same shall have been located.

SEC. 2.—**County Recorders—Fees.**—The county recorders of the several counties are authorized and required to procure suitable books in which the records of all mines and mineral deposits shall be kept, which said books shall be paid for out of the county treasury, and they shall receive for their services herein the following fees: For recording and indexing each claim not exceeding one folio, one dollar; and for each additional folio, twenty cents.

SEC. 3.—**Prior Locations.**—Nothing in this act shall be so construed as to affect the claims to mines and mineral deposits heretofore located and duly recorded.

SEC. 4.—**Territorial Claims.**—The claim of the Territory to all mining claims heretofore located is hereby abandoned, and the same are hereby declared open to re-location and registry: *Provided*, That nothing herein contained shall be so construed as to affect mining claims heretofore sold and disposed of by the Territory.

SEC. 5.—**Placer Mines.**—Nothing in this act shall be construed to apply to placer mines or mining, or other mineral deposits, other than those commonly called veins or lode mines.

SEC. 6.—**Repeal.**—Chapter fifty of the Howell Code, entitled, "Of the Registry and Government of Mines and Mineral Deposits," as well as all other acts or parts of acts in conflict with the provisions of this act, are hereby repealed.

SEC. 7.—**When Effective.**—This act shall take effect and be in force from and after the first day of January, A. D., eighteen hundred and sixty-seven.

Approved November 5, 1866. [Compiled Laws, p. 533.]

An Act Relating to Mines and Mining Claims.

Be it enacted, etc.

SECTION 1.—Any person or persons, who has or may hereafter locate a valid mining claim in this Territory under the laws of the United States, or of the Territory of Arizona, shall be lawfully entitled to the right of way over all adjoining or adjacent mines or mining claims for the purpose of transporting supplies, material or ores, used upon or taken from the claim or claims so entitled to the right of way; and it shall be lawful in the exercise of this right of way to construct such a road, tramway or railway, as may be necessary to transport such supplies, materials or ores; *provided*, that no such right of way shall be exercised in such a manner as to inconvenience or embarrass the owner or owners of such adjoining or adjacent claim or claims; and *provided*, also, that the owner or owners of said adjoining or adjacent claim or claims shall be entitled to remuneration from the person or persons claiming such right of way; the amount of such remuneration, and the manner of ascertaining the same, to be regulated by the rules and regulations as prescribed by an act of the Territorial Legislature, entitled "an act providing for constructing, and maintaining toll roads, bridges and ferries in Arizona Territory." Approved February 18, 1871.

SEC. 2.—All acts, and parts of acts, in conflict with the provisions of this act, are hereby repealed.

SEC. 3.—This act shall take effect and be in force from and after its passage.

Approved March 12, 1881.

[Laws of 1881. p. 167.]

An Act to Protect Landmarks.

Be it enacted, etc.

SECTION 1.—That if any person or persons shall wilfully and maliciously deface, remove, pull down, injure or destroy any location stake, side post, corner post, land mark or monument, or any other legal land boundary monument in this Territory, designating or intending to designate the location boundary or name of any mining claim, lode or vein of mineral, or the name of the discoverer, or date of discovery thereof, the person or persons so offending shall be guilty of a misdemeanor, and on conviction thereof, shall be fined not more than one thousand dollars or imprisoned not more than one year, at the discretion of the court; *provided*, that this act shall not apply to abandoned property.

SEC. 2.—This act shall take effect and be in force from and after its passage.

Approved February 21st, 1883.

[Laws of 1883. p. 31.]

An Act to Encourage Mining.

Be it enacted, etc.

SECTION 1.—That no lands taken up or held as mining claims under the laws of the United States shall be held or used for agricultural purposes, or irrigated from any stream of water, unless there should be more

water in such stream than is required or used for mining purposes; and the use of water for the purpose of irrigating such land for agricultural purposes shall not vest in the person so using the same any right to such water, as against a subsequent appropriation for mining purposes.

SEC. 2.—This act shall take effect and be in force from and after its passage.

Approved March 12, 1881.

[Laws of 1881. p. 162.]

CALIFORNIA.

Water Rights.

1410. The right to the use of running water flowing in a river or stream, or down a cañon or ravine may be acquired by appropriation.

1411. The appropriation must be for some useful or beneficial purpose, and when the appropriator or his successor in interest ceases to use it for such a purpose, the right ceases.

1412. The person entitled to the use may change the place of diversion, if others are not injured by such change, and may extend the ditch, flume, pipe, or aqueduct by which the diversion is made, to places beyond that where the first use was made.

1413. The water appropriated may be turned into the channel of another stream and mingled with its water, and then reclaimed; but in reclaiming it the water already appropriated by another must not be diminished.

1414. As between appropriators, the one first in time is the first in right.

1415. A person desiring to appropriate water must post a notice, in writing, in a conspicuous place at the point of intended diversion, stating therein:

1. That he claims the water there flowing to the extent of (giving the number) inches, measured under a four-inch pressure:

2. The purposes for which he claims it, and the place of intended use;

3. The means by which he intends to divert it, and the size of the flume, ditch, pipe, or aqueduct in which he intends to divert it;

A copy of the notice must, within ten days after it is posted, be recorded in the office of the Recorder of the county in which it is posted.

1416. Within sixty days after the notice is posted, the claimant must commence the excavation or construction of the works in which he intends to divert the water, and must prosecute the work diligently and uninterruptedly to completion, unless temporarily interrupted by snow or rain.

1417. By "completion" is meant conducting the waters to the place of intended use.

1418. By a compliance with the above rules, the claimant's right to the use of the water relates back to the time the notice was posted.

1419. A failure to comply with such rules deprives the claimant of the right to the use of the water as against a subsequent claimant who complies therewith.

1420. Persons who have heretofore claimed the right to water, and who have not constructed works in which to divert it, and who have not diverted nor applied it to some useful purpose, must, after this title takes effect, and within twenty days thereafter, proceed as in this Title provided, or their right ceases. Civil Code, Annotated, Title viii., p. 402.

[The above law expresses the usual manner of securing water rights in the mining states and territories. See Copp's U. S. Mineral Lands.]

Mineral Lands on School Sections.*

An Act regulating the sale of mineral lands belonging to the State of California.

SECTION 1.—**Affidavit.**—Any person desiring to purchase from this State any portion of any sixteenth or thirty-sixth section, that shall have been designated by United States survey as of a mineral character, or which is so in fact, shall make an affidavit before some officer authorized to administer oaths, that he or she is a citizen of the United States; or, if a foreigner, that he has filed his intention to become a citizen of the United States; that he or she is of lawful age, and desires to purchase said land, giving a description thereof by legal subdivisions; that he or she has not entered any portion of such mineral lands which, together with that applied for in such affidavit, will exceed forty acres; that there is no occupation of said land adverse to that which he or she holds; or, if there be any adverse occupation thereof, then he or she must state the name of such adverse occupant, together with the fact that the plat of the township has been on file six months or over, and that such adverse occupant has been in such occupation six months or over.

SEC. 2.—**Preferred Purchaser.**—Any person that shall be in the actual possession of any of said lands described in section one, at the time of the survey thereof by the United States, or at the time of the passage of this act, shall be considered a preferred purchaser thereof to the extent of his or her mining claim: *Provided*, he or she make application for the purchase of the same on or before the first day of January, 1877, if the plat of such survey be already filed in the United States Land Office, and if not so filed, then within six months after the filing of such plat as aforesaid.

SEC. 3.—**Contest.**—When a contest shall arise as to the mineral character of the lands applied for, or from any other cause, the Surveyor-General, or the Register before whom the contest is made, must, within thirty days after the adverse application is filed, unless sooner referred at the request of either claimant, make an order referring such contest to the Superior Court of the county within which the land is situated, and must enter such order in the proper book of his office, and forward a copy thereof to the clerk of the court to which the reference is made. Upon the filing of a copy of such order with the clerk of the court, either party may commence an action in said court to determine the conflict, and the court shall have full and complete jurisdiction to hear and determine the same. Unless an action shall be commenced within ninety days after the copy of the order of reference shall have been filed with the clerk of the court, the party making such demand, or the adverse claimant, if the case is referred without demand, shall be deemed to have waived and surrendered his or her right to purchase, and the Surveyor-General or Register shall proceed as though his or her application had not been made.

SEC. 4—**Price.**—All lands sold under the provisions of this act shall be sold for the sum of two dollars and fifty cents per acre in United States gold coin, payable to the Treasurer of the county in which the lands are situated, within fifty days from the date of the approval by the Surveyor-General; and in case said payment is not made within said

* This law ONLY applies to sections on which minerals are discovered AFTER survey.

fifty days, the land described in the location shall revert to the State without suit, and said location shall be and become null and void. All payments made to the County Treasurer as above provided, shall be paid over and accounted for as other moneys received for State lands are required to be paid over and accounted for.

SEC. 5.—**Certificates of Purchase.**—The Surveyor-General and Register shall, in the matter of approving locations, issuing certificates of purchase or patents, or in other proceedings relating to the sale of lands of a mineral character, which proceedings are not provided for in this act, proceed in the same manner as is now provided for the sale of sixteenth and thirty-sixth sections which are not of a mineral character.

SEC. 6.—**Patents.**—All patents issued by the State to any portion of any sixteenth or thirty-sixth section shall be subject to any vested and accrued water-rights, ditches, and reservoirs used in connection therewith, acquired by priority of possession under local customs and the decisions of the courts, and the right of way for the construction of ditches and canals for mining and other purposes, over all of the sixteenth and thirty-sixth sections owned by the State, is hereby granted and confirmed.

SEC. 7.—**Restriction on Issuance of Patents.**—After the passage of this act, no patents shall be issued for any of the lands described in this act upon which, at the time of the application therefor, there was and still is any actual *bona fide* mining claim, except to the person who is the owner of such mining claim under local mining customs; and when an applicant for such lands, not owning such mining claim, shall have paid the purchase-money therefor, in whole or in part, he may present his certificate of purchase and receive in exchange therefor, from the Register, a certificate showing the whole amount paid; and the Controller, upon the surrender of such certificate, must draw his warrant in favor of the person surrendering such certificate, for the amount therein specified, on the Treasurer of State, who must pay the sum out of the funds into which the purchase money was paid: *Provided*, That the owner of such mining-claim, under such mining customs, shall apply to purchase the same within six months after the plat of the township containing such land shall have been filed in the local United States land office, on or before the first day of January, 1877: *And provided further*, That any owner of a *bona fide* mining claim who shall have entered into an agreement with the applicant for any portion of a sixteenth or thirty-sixth section upon which said mining claim is situated, for the procurement of a title for the same, shall not avail himself of the provisions of this section. The Governor of this State shall not sign any patent contrary to the provisions of this act.

Stats. 1873–4, p. 766. Approved March 28, 1874, as amended February 3, 1876.—Stats. 1875–6, p. 20; and April 6, 1880.—Stats. 1880, p. 26.

An Act to amend an Act entitled an Act regulating the sale of Mineral Lands belonging to the State, Approved March twenty-eighth, eighteen hundred and seventy-four.

The People, etc.

SECTION 1.—Section three of "an act regulating the sale of mineral lands belonging to the State, approved March twenty-eighth, eighteen hundred and seventy-four," is hereby amended so as to read as follows:

SEC. 3.—When a contest shall arise as to the mineral character of the lands applied for, or from any other cause, the Surveyor-General, or the Register before whom the contest is made, must, within thirty days after the adverse application is filed, unless sooner referred, at the request of either claimant, make an order referring such contest to the Superior Court of the county within which the land is situated, and must enter such order in the proper book of his office, and forward a copy thereof to the clerk of the court to which the reference is made. Upon the filing of a copy of such order with the clerk of the court, either party may commence an action in said court to determine the conflict, and the court shall have full and complete jurisdiction to hear and determine the same. Unless an action shall be commenced within ninety days after the copy of the order of reference shall have been filed with the clerk of the court, the party making such demand, or the adverse claimant, if the case is referred without demand, shall be deemed to have waived and surrendered his or her right to purchase, and the Surveyor-General or Register shall proceed as though his or her application had not been made.

SEC. 2.—This act shall take effect and be in force from and after its passage.

Approved April 6, 1880.

[Laws of 1880. p. 26.]

COLORADO.

An Act Concerning Mines.

Be it enacted by the Council and House of Representatives of Colorado Territory:

SECTION 1.—**Length.**—The length of any lode claim hereafter located may equal, but not exceed fifteen hundred feet along the vein.

SEC. 2.—**Width.**—The width of lode claims hereafter located in Gilpin, Clear Creek, Boulder, and Summit counties, shall be seventy-five feet on each side of the center of the vein or crevice; and in all other counties the width of the same shall be one hundred and fifty feet on each side of the center of the vein or crevice: *Provided*, That hereafter any county may, at any general election, determine upon a greater width, not exceeding three hundred feet on each side of the center of the vein or lode, by a majority of the legal votes cast at said election, and any county, by such vote at such election, may determine upon a less width than above specified.

SEC. 3.—**Location Certificate.**—The discoverer of a lode shall, within three months from the date of discovery, record his claim in the office of the recorder of the county in which such lode is situated, by a location certificate, which shall contain: 1st, the name of the lode; 2d, the name of the locator; 3d, the date of location; 4th, the number of feet in length claimed on each side of the center of the discovery shaft; 5th, the general course of the lode as near as may be.

SEC. 4. Any location certificate of a lode claim which shall not contain the name of the lode, the name of the locator, the date of location, the number of lineal feet claimed on each side of the discovery shaft, the general course of the lode, and such description as shall identify the claim with reasonable certainty, shall be void.

SEC. 5.—**Discovery Shaft and Staking.**—Before filing such location certificate, the discoverer shall locate his claim by first sinking a discovery shaft upon the lode, to the depth of at least ten feet from the lowest part of the rim of such shaft at the surface, or deeper, if necessary to show a well-defined crevice. *Second*, by posting at the point of discovery on the surface, a plain sign or notice containing the name of the lode, the name of the locator, and the date of discovery. *Third*, by marking the surface boundaries of the claim.

SEC. 6. Such surface boundaries shall be marked by six substantial posts, hewed or marked on the side or sides which are in toward the claim, and sunk in the ground, to wit: One at each corner and one at the center of each side line. Where it is practically impossible on account of bed-rock or precipitous ground to sink such posts, they may be placed in a pile of stones.

SEC. 7.—**Equivalent to a Discovery Shaft.**—Any open cut, cross-cut, or tunnel, which shall cut a lode at the depth of ten feet below the surface, shall hold such lode the same as if a discovery shaft were sunk thereon, or an adit of at least ten feet in along the lode, from the point where the lode may be in any manner discovered, shall be equivalent to a discovery shaft.

SEC. 8.—**Sixty Days.**—The discoverer shall have sixty days from the time of uncovering or disclosing a lode to sink a discovery shaft thereon.

SEC. 9.—**Claim Defined by the Surface Lines.**—The location, or location certificate, of any lode claim shall be construed to include all surface ground within the surface lines thereof, and all lodes and ledges throughout their entire depth, the top or apex of which lies inside of such lines extended downward, vertically, with such parts of all lodes or ledges as continue to dip beyond the side lines of the claim, but shall not include any portion of such lodes or ledges beyond the end lines of the claim or the end lines continued, whether by dip or otherwise, or beyond the side lines in any other manner than by the dip of the lode.

SEC. 10. If the top or apex of a lode in its longitudinal course extends beyond the exterior lines of the claim at any point on the surface, or as extended vertically downward, such lode may not be followed in its longitudinal course beyond the point where it is intersected by the exterior lines.

SEC. 11.—**Right of Way and Right of Surface.**—All mining claims now located, or which may be hereafter located, shall be subject to the right of way of any ditch or flume for mining purposes, or of any tramway or pack trail, whether now in use, or which many be hereafter laid out across any such location. *Provided, always,* That such right of way shall not be exercised against any location duly made and recorded, and not abandoned prior to the establishment of the ditch, flume, tramway, or pack trail, without consent of the owner, except by condemnation, as in case of land taken for public highways. Parol consent to the location of any such easement, accompanied by the completion of the same over the claim, shall be sufficient without writings. *And provided further,* That such ditch or flume shall be so constructed that the water from such ditch or flume shall not injure vested rights by flooding or otherwise.

SEC. 12. When the right to mine is in any case separate from the ownership or right of occupancy to the surface, the owner or rightful occupant of the surface may demand satisfactory security from the miner, and if it be refused, may enjoin such miner from working until such security is given. The order for injunction shall fix the amount of bond.

SEC. 13.—**Re-location by the Owner.**—If at any time the locator of any mining claim heretofore or hereafter located, or his assigns, shall apprehend that his original certificate was defective, erroneous, or that the requirements of the law had not been complied with before filing; or shall be desirous of changing his surface boundaries, or of taking in any part of an overlapping claim which has been abandoned; or in case the original certificate was made prior to the passage of this law, and he shall be desirous of securing the benefits of this Act, such locator or his assigns may file an additional certificate, subject to the provisions of this Act. *Provided,* That such re-location does not interfere with the existing rights of others at the time of such re-location, and no such re-location or the record thereof, shall preclude the claimant or claimants from proving any such title or titles as he or they may have held under previous location.

SEC. 14.—**Labor.**—The amount of work done, or improvements made during each year, shall be that prescribed by the laws of the United States.

SEC. 15.—**Proof of Labor.**—Within six months after any set time, or annual period herein allowed for the performance of labor, or making improvements upon any lode claim, the person on whose behalf such outlay was made, or some person for him, shall make and record an affidavit, in substance as follows:

STATE OF COLORADO }
County of ———. } ss.

Before me, the subscriber, personally appeared ———, who, being duly sworn, saith that at least ——— dollars' worth of work or improvements were performed or made upon [here describe claim or part of claim] situate in ——— mining district, county of ———, State of Colorado. Such expenditure was made by or at the expense of ———, owners of said claim, for the purpose of said claim.

[Jurat.] [Signature.]

And such signature shall be *prima facie* evidence of the performance of such labor.

SEC. 16.—**Relocation of Abandoned Claims.**—The re-location of abandoned lode claims shall be by sinking a new discovery shaft and fixing new boundaries in the same manner as if it were the location of a new claim; or the re-locator may sink the original discovery shaft ten feet deeper than it was at the time of abandonment, and erect new, or adopt the old boundaries, renewing the posts, if removed or destroyed. In either case a new location stake shall be erected. In any case, whether the whole or part of an abandoned claim is taken, the location certificate may state that the whole or any part of the new location is located as abandoned property.

SEC. 17.—**One Record for Each Claim.**—No location certificate shall claim more than one location, whether the location be made by one or several locators. And if it purport to claim more than one location, it shall be absolutely void, except as to the first location therein described. And if they are described together, or so that it cannot be told which location is first described, the certificate shall be void as to all.

SEC. 18. All Acts or parts of Acts in conflict with this Act, are repealed.

SEC. 19. This Act shall be in force from and after June 15, 1874.

Approved February 13, 1874.

An Act Concerning Mines.

Be it enacted by the Council and House of Representatives of Colorado Territory:

SEC. 1.—**Right of Survey and Inspection.**—In all actions pending in any district court of this Territory, wherein the title or right of possession to any mining claim shall be in dispute, the said court, or the judge thereof, may, upon the application of any of the parties to such suit, enter an order for the underground as well as surface survey of such part of the property in dispute, as may be necessary to a just determination of the question involved. Such order shall designate some

competent surveyor, not related to any of the parties to such suit, nor in any wise interested in the result of the same; and upon the application of the party adverse to such application, the court may also appoint some competent surveyor, to be selected by such adverse applicant, whose duty it shall be to attend upon such survey, and observe the method of making the same; said second survey to be at the cost of the party asking therefor. It shall also be lawful in such order to specify the names of witnesses named by either party, not exceeding three on each side, to examine such property, who shall thereupon be allowed to enter into such property and examine the same; said court, or the judge thereof, may also cause the removal of any rock, debris, or other obstacle in any of the drifts or shafts of said property, when such removal is shown to be necessary to a just determination of the questions involved; *Provided*, however, that no such order shall be made for survey and inspection, except in open court or in chambers, upon notice of application for such order of at least six days, and not then except by agreement of parties, or upon the affidavit of two or more persons that such survey and inspection is necessary to the just determination of the suit, which affidavits shall state the facts in such case, and wherein the necessity for survey exists; nor shall such order be made unless it appears that the party asking therefor had been refused the privilege of survey and inspection by the adverse party.

SEC. 2.—**Mandatory Writ to Restore Possession.**—The said district courts of this Territory, or any judge thereof, sitting in chancery, shall have, in addition to the power already possessed, power to issue writs of injunction for affirmative relief, having the force and effect of a writ of restitution, restoring any person or persons to the possession of any mining property from which he or they may have been ousted, by force and violence, or by fraud, or from which they are kept out of possession by threats, or whenever such possession was taken from him or them by entry of the adverse party on Sunday, or a legal holiday, or while the party in possession was temporarily absent therefrom. The granting of such writ to extend only to the right of possession under the facts of the case in respect to the manner in which the possession was obtained, leaving the parties to their legal rights on all other questions as though no such writ had issued.

SEC. 3.—**Unlawful Entry.**—In all cases where two or more persons shall associate themselves together for the purpose of obtaining the possession of any lode, gulch, or placer claim, then in the actual possession of another, by force and violence, or threats of violence, or by stealth, and shall proceed to carry out such purpose by making threats against the party or parties in possession, or who shall enter upon such lode or mining claim for the purpose aforesaid, or who shall enter upon or into any lode, gulch, placer claim, quartz mill, or other mining property, or not being upon such property, but within hearing of the same, shall make any threats, or make use of any language, signs, or gestures, calculated to intimidate any person or persons at work on said property, from continuing to work thereon or therein, or to intimidate others from engaging to work thereon or therein, every such person so offending, shall, on conviction thereof, be fined in a sum not to exceed two hundred and fifty dollars, and be imprisoned in the county jail not less than thirty days nor more than six months; such fine to be dis-

charged either by payment or by confinement in said jail until such fine is discharged at the rate of two dollars and fifty cents ($2.50) per day. On trials under this section, proof of a common purpose of two or more persons to obtain possession of property as aforesaid, or to intimidate laborers as above set forth, accompanied or followed by any of the acts above specified by any of them, shall be sufficient evidence to convict any one committing such acts, although the parties may not be associated together at the time of committing the same.

SEC. 4.—**Guilty of Murder.**—If any person or persons shall associate and agree to enter or attempt to enter by force of numbers and the terror such numbers are calculated to inspire; or by force and violence, or by threats of violence against any person or persons in the actual possession of any lode, gulch, or placer claim; and upon such entry or attempted entry, any person or persons shall be killed, said persons, and all and each of them so entering or attempting to enter, shall be deemed guilty of murder in the first degree, and punished accordingly. Upon the trials of such cases, any person or parties cognizant of such entry, or attempted entry, who shall be present, aiding, assisting, or in any wise encouraging such entry, or attempted entry, shall be deemed a principal in the commission of said offense.

SEC. 5. This Act shall take effect and be in force from and after its passage.

Approved, February 13, 1874.

Placer Mining Claims.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. The discoverer of a placer claim shall, within thirty days from the date of discovery, record his claim in the office of the recorder of the county in which said claim is situated, by a location certificate, which shall contain: *First*, the name of the claim, designating it as a placer claim. *Second*, the name of the locator. *Third*, the date of location. *Fourth*, the number of acres or feet claimed. And *Fifth*, a description of the claim by such reference to natural objects or permanent monuments as shall identify the claim.

Before filing such location certificate, the discoverer shall locate his claim: *First*, by posting upon such claim a plain sign or notice, containing the name of the claim, the name of the locator, the date of discovery, and the number of acres or feet claimed. *Second*, by marking the surface boundaries with substantial posts, and sunk in the ground, to wit: One at each angle of the claim.

SEC. 2. On each placer claim of one hundred and sixty acres or more heretofore or hereafter located, and until a patent has been issued therefor, not less than one hundred dollars' worth of labor shall be performed or improvements made by the first day of August, 1879, and by the first day of August of each year thereafter. On all placer claims containing less than one hundred and sixty acres, the expenditure during each year shall be such proportion of one hundred dollars, as the number of acres bears to one hundred and sixty. On all placer claims containing less than twenty acres, the expenditures during each year shall not be less than twelve dollars; but when two or more claims lie contiguous, and are owned by the same person, the expenditure hereby required for each claim may be made on any one claim; and upon a

failure to comply with these conditions, the claim or claims upon which such failure occurred, shall be open to relocation, in the same manner as if no location of the same had ever been made; *provided*, that the original locators, their heirs, assigns, or legal representatives, have not resumed work upon the claim after failure and before such location; *provided*, the aforesaid expenditures may be made in building or repairing ditches to conduct water upon such ground, or in making other mining improvements necessary for the working of such claim.

Upon the failure of any one of several co-owners to contribute his proportion of the expenditures required hereby, the co-owners who have performed the labor or made the improvements, may at the expiration of the year, to wit: the first of August, 1879, for the locations heretofore made, and one year from the date of locations hereafter made, give such delinquent co-owner personal notice in writing, or if he be a non-resident of the state, a notice by publication in the newspaper published nearest the claim for at least once a week for ninety days, and mailing him a copy of such newspaper if his address be known; and if at the expiration of ninety days after such notice in writing, or after the first publication of such notice, such delinquent should fail or refuse to contribute his proportion of the expenditure required by this action [section], his interest in the claim shall become the property of his co-owners who have made the required expenditures.

[The foregoing was filed in the office of the Secretary of State by the Governor March 12, 1879, without his signature, and became a law under Section 11, Art. IV., Constitution of Colorado.]

MISCELLANEOUS GENERAL LAWS, 1877.

Taxation.

Extract from the Constitution of Colorado.

ART. X., SEC. 3.—**Mines Exempt.**—Page 58. Mines and mining claims bearing gold, silver, and other precious metals (except the net proceeds and surface improvements thereof), shall be exempt from taxation for the period of ten years from the date of the adoption of this constitution (July 1, 1876), and thereafter may be taxed as provided by law.

Penal Provisions.

764. SEC. 169.—**False Weights.** If any person shall knowingly have, keep, or use any false or fraudulent scales or weights for weighing gold or gold dust, or any other article or commodity, every such person so offending shall, on conviction, be fined not exceeding five hundred dollars, or imprisoned in the county jail not exceeding six months.

765. SEC. 170.—**Punishment for Certain Mill-Owners.**—The owner, manager, or agent of any species of quartz mill, arastra mill, furnace, or cupel, employed in extracting gold from quartz, pyrites, or other minerals, who shall neglect or refuse to account for or pay over and deliver all the proceeds thereof to the owner of such quartz, pyrites, or other minerals, excepting such portion of said proceeds as he is entitled to in return for his services, shall, on conviction, be fined in a sum not exceeding one thousand dollars, or be imprisoned in the penitentiary not exceeding one year.

776. Sec. 181.—**Salting Ores.**—That every person who shall mingle or cause to be mingled with any sample of gold or silver bearing ore, any valuable metal or substance whatever, that will increase or in any way change the value of said ore, with the intent to deceive, cheat, or defraud any person or persons, shall, on conviction thereof, be punished by a fine not less than $500 nor more than $1,000, or by confinement in the penitentiary for a term of not less than one nor more than fourteen years, or by both such fine and imprisonment.

1603. Sec. 1.—**Destroying Landmarks.**—That if any person or persons shall willfully and maliciously deface, remove, pull down, injure, or destroy any location-stake, side-post, corner-post, landmark, or monument, or any other legal land boundary monument in this state, designating, or intending to designate the location, boundary, or name of any mining claim, lode, or vein of mineral, or the name of the discoverer, or date of discovery thereof; the person or persons so offending shall be guilty of a misdemeanor, and, on conviction thereof, shall be fined not more than one thousand dollars, or imprisoned not more than one year, at the discretion of the court; *provided*, that this Act shall not apply to abandoned property.

673. Sec. 78.—**Passing Counterfeit Gold Dust.**—Every person who shall mingle or procure to be mingled with any uncoined gold or gold dust now current, or which shall hereafter be current in this state, any counterfeit gold dust, or counterfeit uncoined gold, or any base metal or substance whatever, with intent to utter or pass the same, or to procure the same to be uttered or passed as gold dust or uncoined gold, shall, on conviction thereof, be punished by a fine not to exceed one thousand dollars, or by confinement in the penitentiary for a term not less than one year nor more than fourteen years.

1961. Sec. 5.—**Buying Stolen Ore.**—Any person, association, or corporation, or the agent of any person, association, or corporation, who shall knowingly purchase or contract to purchase, or shall make any payment for or on account of any ore, which shall have been taken from any mine or claim, by persons who have taken or may be holding possession of any such mine or claim, contrary to any penal law now in force, or which may be hereafter enacted, shall be considered as an accessory after the fact to the unlawful holding or taking of such mine or claim, and upon conviction shall be subjected to the same punishment to which the principals may be liable.

1962. Sec. 6.—**False Mill Weights.**—Any person, association, or corporation, or the agent of any person, association or corporation engaged in the business of milling, sampling, concentrating, reducing, shipping, or purchasing ores as aforesaid, who shall keep or use any false or fraudulent scales or weights for weighing ore, or who shall keep or use any false or fraudulent assay scales or weights for ascertaining the assay value of ore, knowing them to be false, every person so offending shall be deemed guilty of a misdemeanor, and on conviction thereof, shall be fined in a sum not exceeding one thousand (1,000) dollars, nor less than one hundred (100) dollars, or imprisonment not more than one year, or both, at the discretion of the court.

1963. Sec. 7.—**False Mill Returns.**—Any person, corporation, or association, or the agent of any person, corporation, or association, engaged in the milling, sampling, concentrating, reducing, shipping, or

purchasing of ores in this state, who shall, in any manner, knowingly alter or change the true value of any ores delivered to him or them, so as to deprive the seller of the result of the correct value of the same, or who shall substitute other ores for that delivered to him or them, or who shall issue any bill of sale or certificate of purchase that does not exactly and truthfully state the actual weight, assay value, and total amount paid for any lot or lots of ore purchased, or who, by any secret understanding or agreement with another, shall issue a bill of sale or certificate of purchase that does not truthfully and correctly set forth the weight, assay value, and total amount paid for any lot or lots of ore purchased by him or them, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be fined in a sum not exceeding one thousand (1,000) dollars, nor less than one hundred (100) dollars, or imprisonment not more than one year, or both, at the discretion of the court.

1964. SEC. 8.—**Larceny of Ores.**—If any person, lessee, licensee, or employee in or about any mine in this State, shall break and sever, with intent to steal the ore or mineral from any mine, lode, ledge, or deposit in this State, or shall take, remove, or conceal the ore or mineral from any mine, lode, ledge, or deposit, with intent to defraud the owner or owners, lessee, or licensee of any such mine, lode, ledge, or deposit, such offender shall be deemed guilty of felony, and on conviction, shall be punished as for grand larceny.

Drainage of Mines.

1830. SECTION 1.—**Proportionate Share.**—Whenever contiguous and adjacent mines upon the same or upon separate lodes have a common ingress of water, or from subterraneous communication of the water have a common drainage, it shall be the duty of the owners, lessees, or occupants of each mine so related to provide for their proportionate share of the drainage thereof.

1831. SEC. 2.—**Failure to Drain.**—Any parties so related, failing to provide as aforesaid, for the drainage of the mines owned or occupied by them, thereby imposing an unjust burden upon neighboring mines whether owned or occupied by them, shall pay respectively to those performing the work of drainage, their proportion of the actual and necessary cost and expense of doing such drainage, to be recovered by an action in any court of competent jurisdiction.

1832. SEC. 3.—**Draining Corporation.**—It shall be lawful for all mining corporations or companies, and all individuals engaged in mining, having thus a common interest in draining such mines, to unite for the purpose of effecting the same, under such common name and upon such terms and conditions as may be agreed upon; and every such association, having filed a certificate of incorporation, as provided by law, shall be deemed a corporation, with all the rights, incidents, and liabilities of a body corporate, so far as the same may be applicable.

1833. SEC. 4.—**Failure to Mutually Agree.**—Failing to mutually agree, as indicated in the preceding section, for drainage jointly, one or more of the said parties may undertake the work of drainage, after giving reasonable notice; and should the remaining parties then fail, neglect or refuse to unite in equitable arrangements for doing the work, or sharing the expense thereof, they shall be subject to an action there-

for as already specified, to be enforced in any court of competent jurisdiction.

1834. SEC. 5.—**Court Proceedings.**—When action is commenced to recover the cost and expenses for draining a lode or mine, it shall be lawful for the plaintiff to apply to the court, if in session, or to the judge thereof in vacation, for an order to inspect or examine the lodes or mines claimed to have been drained by the plaintiff; or some one for him, shall make affidavit that such inspection or examination is necessary for a preparation of the case for trial. The court or judge shall grant an order for the underground inspection and examination of the lode or mines described in the petition. Such order shall designate the number of persons, not exceeding three besides the plaintiff or his representative, to examine and inspect such lode and mines, and take the measurement thereof, relating the amount of water drained from the lode or mine, or the number of fathoms of ground mined and worked out of the lode or mines claimed to have been drained, the cost of such examination and inspection to be borne by the party applying therefor. The court or judge shall have power to cause the removal of any rock, debris, or other obstacles in any lode or vein, when such removal is shown to be necessary to a just determination of the question involved; *provided*, that no such order for inspection and examination shall be made except in open court, or at chambers, upon notice of application for such order of at least three days, and not then except by agreement of parties, nor unless it appears that the plaintiff has been refused the privilege of making the inspection and examination by the defendant, his or their agent.

1835. SEC. 6.—**Water Beyond Control.**—That hereafter, when any person or persons, or corporation, shall be engaged in mining or milling, and in the prosecution of such business shall hoist or raise water from the mines or natural channels, and the same shall flow away from the premises of such persons, or corporations, to any natural channel or gulch, the same shall be considered beyond the control of the party so hoisting or raising the same, and may be taken and used by other parties the same as that of natural water courses.

1836. SEC. 7.—**Liable for Injury.**—After any such water shall have been so raised, and the same shall have flown into any such natural channel, gulch, or draw, the party so hoisting or raising the same shall only be liable for injury caused thereby, in the same manner as riparian owners along natural water courses.

1837. SEC. 8.—**Undeveloped Mines.**—The provisions of this Act shall not be construed to apply to incipient or undeveloped mines, but to those only which shall have been opened, and shall clearly derive a benefit from being drained.

1838. SEC. 9.—**Admissible Evidence.**—In trial of cases arising under this Act, the court shall admit evidence of the normal stand, or position of the water while at rest in an idle mine, also the observed prevalence of a common water level, or a standing water line in the same, or separate lodes; also, the effect (if any) the elevating or depressing the water by natural or mechanical means in any given lode, has upon elevating or depressing the water in the same, contiguous, or separate lodes or mines; also, the effect which draining or ceasing to drain any given lode or mine had upon the water in the same or con-

tiguous or separate lodes or mines, and all other evidence which tends to prove the common ingress or subterraneous communication of water into the same lode or mine, or contiguous or separate lodes or mines.

Ore.

1957. SECTION 1.—**Contents of Record.**—That every person, association, or corporation that shall be engaged in the business of milling, sampling, concentrating, reducing, shipping, or purchasing ores in the State of Colorado, shall keep and preserve a book in which shall be entered at the time of the delivery of each lot of ore:

First—The name of the party on whose behalf such ore is delivered, as stated.

Second—The name of the teamster, packer, or other persons actually delivering such ore, and the name of the owner of the team or pack train delivering such ore.

Third—The weight or amount of every such lot of ore.

Fourth—The name and location of the mine or claim from which it shall be stated that the same has been mined or procured.

Fifth—The date of delivery of any and all lots or parcels of ore.

1958. SEC. 2.—**Proceedings when Ore is Stolen.**—Whenever affidavit shall have been made before any police magistrate of any town in this State, or any justice of the peace of any county, by any person, that ore has been stolen from him, stating as near as may be the amount and value of the ore stolen, such person upon presentation of a certified copy of such affidavit, shall have access to such book, and may examine the entries which may have been made therein during a period of fifteen days next preceding the filing of such affidavit; *provided,* that the person making such affidavit shall, at the time of making the same, have a present interest in the product of the mine or claim from which said ore has been stolen, or in the ore alleged to have been stolen.

1959. SEC. 3.—**Failure to Keep Required Books.**—Every person, association, or corporation that shall fail or refuse to keep the book required by the terms of the first section of this Act, or shall fail or refuse to make any proper entry therein, or who shall make any false entry therein, or who shall refuse to any person who may be entitled to the same, as provided by section two (2) of this Act, the right of inspection thereof, shall forfeit and pay for each and every violation of the provisions of said section a penalty of not less than fifty (50) nor more than three hundred (300) dollars, to be collected by action of debt at the suit of any person who may sue for the same. In addition to such penalty, any person, association, or corporation violating the provisions of said first section, shall be liable at the suit of the party or persons aggrieved, in the proper form of action, for all damages which may accrue to any party or person by reason of such violation. And in all actions the fact that a false entry has been made shall be *prima facie* evidence that the same was made wilfully or knowingly.

1960. SEC. 4.—**Failure to Make Inquiries.**—If any person, association, or corporation shall fail or neglect to make the inquiries necessary to the making of the proper entries in said book, as provided in section one (1) of this Act, or shall so negligently make entries therein that any lot of ore cannot be particularly identified, or so negligently that it cannot be perceived therefrom what person delivered any lot of

ore or received the proceeds of the same when purchased, or shall fail to keep such book, or shall wilfully suffer the same to be lost, or mislaid, so that the same cannot be produced for inspection, such failure or neglect shall not excuse any party defendant in any suit brought under the preceding section from judgment for any penalty prescribed by said section.

Water Rights.

1798. SEC. 2.—**Right of Way.**—Whenever any person or persons are engaged in bringing water into any portion of the mines, they shall have the right of way secured to them, and may pass over any claim, road, ditch, or other structure; *provided,* the water be guarded so as not to interfere with prior rights.

1821. SEC. 11. All mining claims now located, or which may be hereafter located, shall be subject to the right of way of any ditch or flume for mining purposes, or of any tramway or pack-trail, whether now in use, or which may be hereafter laid out across any such location; *provided, always,* that such right of way shall not be exercised against any location duly made and recorded, and not abandoned prior to the establishment of the ditch, flume, tramway, or pack-trail, without consent of the owner, except by condemnation, as in case of land taken for public highways. Parol consent to the location of any such easement, accompanied by the completion of the same over the claim, shall be sufficient without writings; *and provided further,* that such ditch or flume shall be so constructed that the water from such ditch or flume shall not injure vested rights by flooding or otherwise.

2779. SEC. 3.—**Miners' Inch.**— * * And water sold by the inch by any individual or corporation, shall be measured as follows, to wit: Every inch shall be considered equal to an inch square orifice under a five-inch pressure, and a five-inch pressure shall be from the top of the orifice of the box put into the banks of the ditch, to the surface of water; said boxes, or any dot or aperture through which such water may be measured, shall in all cases be six inches perpendicular inside measurement, except boxes delivering less than twelve inches, which may be square, with or without slides; all slides for the same shall move horizontally and not otherwise; and said box put into the banks of ditch shall have a descending grade from the water in ditch of not less than one-eighth of an inch to the foot.

Tailings.

1804. SEC. 8.—**Miners Responsible.**—In no case shall any person or persons be allowed to flood the property of another person with water, or wash down the tailings of his or their sluice upon the claim or property of other persons, but it shall be the duty of every miner to take care of his own tailings, upon his own property, or become responsible for all damages that may arise therefrom.

Hauling Quartz.

1805. SEC. 9.—**Right of Way.**—Every miner shall have the right of way across any and all claims for the purpose of hauling quartz from his claim.

Mining Claims, Real Estate, Actions.

185. SEC. 26.—**Definitions.**—The terms "land" and "real estate," as used in this chapter, shall be construed as co-extensive in meaning with the terms "lands, tenements, hereditaments," and as embracing mining claims and other claims, and chattels real. The term "deed" includes mortgages, leases, releases, and every conveyance or encumbrance under seal.

2126. SEC. 3.—**Transferable Interest.**—The owner of every claim or improvement, on every tract or parcel of land, has a transferable interest therein, which may be sold in execution or otherwise; and any sale of such improvement is a sufficient consideration to sustain a promise.

2131. SEC. 8.—**Claimant May Maintain Action.**—Any person settled upon any of the public lands belonging to the United States, may maintain trespass *quare clausum fregit*, trespass, ejectment, forcible entry and detainer, unlawful detainer, and forcible detainer, for injuries done to the possession thereof.

2135. SEC. 12.—**City and Village Lots.**—Any person who may have a title to occupy any lot or lots within any city or village plot, or any lots or mining claim within any mining district in this state, in virtue of a certificate, deed of gift or purchase from the original claimant or claimants, or their assigns, as well as all purchasers, under any decree or execution of any of the so-called provisional government courts, peoples' or miners' courts, of the lands situate within any city or village plot, or any lots, land, or mining claims situate within any mining district, together with the original claimant or claimants of said lots, land, or mining claims, shall be entitled to maintain the actions authorized by the eighth section of this chapter, against any and all persons who shall enter upon and occupy said lots, lands, or mining claims, or any of them; *provided*, it shall be lawful for the citizens of any mining district to declare an abandonment of any creek, river, gulch, bank, or mining claim a forfeiture of the rights of the claimants thereto; in which case the parties claimant shall not be enabled to maintain either of the actions mentioned in section eight of this chapter.

2136. SEC. 13.—**United States Title.**—Nothing in this chapter contained shall be construed to deny the right of the United States to dispose of any lands in this state; nor shall the fact that the title to any lots, lands, lodes, or mining claims hath not passed from the United States, be any bar to the recovery of the plaintiff in either of the actions specified in section eight of this chapter. As against the United States, and all persons holding any of said lands under the United States, or the laws thereof, this chapter shall be of non-effect and void.

For laws as to liens of miners and mechanics, see Session Laws of 1881, p. 168; Laws of 1883, p. 225.

DAKOTA.

Location and Size of Lodes and Mining Claims.

1. **Length of Lode.**—The length of any lode claim hereafter located within this Territory may equal, but shall not exceed, fifteen hundred feet along the vein or lode.

2. **Width of Lode.**—The width of lode claims shall be one hundred and fifty feet on each side of the center of the vein or crevice; *Provided*, That any county may, at any general election, determine upon a greater width not exceeding three hundred feet on each side of the center of the vein or lode, by a majority of the legal votes cast at said election; and any county, by such vote at such election, may determine upon a less width than above specified; *Provided*, That not less than twenty-five feet on each side of the vein or lode shall be prohibited.

3. **Discoverer to Record His Claim.**—That the discoverer of a lode shall, within twenty days from the date of discovery, record his claim in the office of the register of deeds of the county in which such lode is situated, by a location certificate, which shall contain:

(1) The name of the lode.

(2) The name of the locator.

(3) The date of location.

(4) The number of feet in length claimed on each side of the discovery shaft.

(5) The number of feet in width claimed on each side of the vein or lode.

(6) The general course of the lode, as near as may be.

4. **When Certificate Void.**—Any location certificate of a lode claim which shall not contain the name of the lode, the name of the locator, the date of location, the number of lineal feet claimed on each side of the discovery shaft, the number of feet in width claimed, the general course of the lode, and such description as shall identify the claim with reasonable certainty, shall be void.

5. **Manner of Locating Claim.**—Before filing such location certificate, the discoverer shall locate his claim by first sinking a discovery shaft thereon sufficient to show a well-defined mineral vein or lode; second, by posting at the point of discovery, on the surface, a plain sign or notice containing the name of the lode, the name of the locator, and the date of discovery, the number of feet claimed in length on either side of the discovery, and the number of feet in width claimed on each side of the lode; third, by marking the surface boundaries of the claim.

6. **Marking Surface Boundaries.**—Such surface boundaries shall be marked by eight (8) substantial posts, hewed or blazed on the side or sides facing the claim, and sunk in the ground, to wit: one at each corner, and one at the centre of each side line, and one at each end of the lode. When it is impracticable, on account of rocks or precipitous ground, to sink such posts, they may be placed in a monument of stone.

7. **Requisite of Location.**—Any open cut, cross cut, or tunnel, at a depth sufficient to disclose the mineral vein or lode, or an adit of at least ten (10) feet in along the lode, from a point where the lode may be in any manner discovered, shall be equivalent to a discovery shaft.

8. **Time Discoverer Has to Perform Labor.**—The discoverer shall have thirty days from the time of uncovering or disclosing a lode, to sink a discovery shaft thereon.

9. **Certificate Construed to Contain.**—The location, or location certificate, of any lode claim shall be construed to include all surface ground within the surface lines thereof, and all lodes and ledges throughout their entire depth, the top or apex of which lies inside of such lines extended vertically, with such parts of all lodes or ledges as continue, by dip beyond the side lines of the claim, but shall not include any portion of such lodes or ledges beyond the end lines of the claim, or the end lines continued, whether by dip or otherwise, or beyond the side lines in any other manner than by the dip of the lode.

10. **Claim Not Beyond Exterior Lines.**—If the top or apex of the lode in its longitudinal course extends beyond the exterior lines of the claim at any point on the surface, or as extended vertically downward, such lode may not be followed in its longitudinal course beyond the point where it is intersected by the exterior.

11. **Claims Subject to Right of Way.**—All mining claims now located, or which may be hereafter located, shall be subject to the right of way of any ditch or flume for mining purposes, or of any tramway or pack trail which is now in use, or which may be hereafter laid out across any such location: *Provided always*, That such right of way shall not be exercised against any location duly made and recorded, and not abandoned prior to the establishment of the ditch, flume, tramway, or pack-trail, without consent of the owners, except by condemnation, as in case of land taken for public highways; parol consent to the location of any such easement, accompanied by the completion of the same over the claim, shall be sufficient without writing; *and provided further*, That such ditch or flume be so constructed that the water from such ditch or flume shall not injure vested rights by flooding or otherwise.

12. **Owner May Demand Security from Miner.**—When the right to mine is in any case separate from the ownership or right of occupancy to the surface, the owner or rightful occupant of the surface may demand satisfactory security from the miner, and if it be refused, may enjoin such miner from working until such security is given. The order for injunction shall fix the amount of bond.

13. **Filing an Amended Certificate.**—If at any time the locator of any mining claim heretofore or hereafter located, or his assigns, shall apprehend that his original certificate was defective, erroneous, or that the requirements of the law had not been complied with before filing, or shall be desirous of changing his surface boundaries, or of taking in any part of an overlapping claim which has been abandoned, or in case the original certificate was made prior to the passage of this law, and he shall be desirous of securing the benefit of this act, such locator or his assigns may file an additional certificate subject to the provisions of this act: *Provided*, That such relocation does not interfere with the existing rights of others at the time of such relocation, and no such relo

cation or the record thereof shall preclude the claimant or claimants from proving any such title or titles as he or they may have held under previous locations.

14. Work Performed Annually.—The amount of work to be done or improvements made during each year, to hold possession of a mining claim, shall be that prescribed by the laws of the United States, to wit: one hundred dollars annually.

15. Affidavit of Labor to be Made.—Within six months after any set time or annual period herein allowed for the performance of labor or making improvements upon any lode claim, the person on whose behalf such outlay was made, or some person for him, shall make and record an affidavit in substance as follows:

TERRITORY OF DAKOTA, }
County of ———. } ss.

Before me, the subscriber, personally appeared ———, who, being duly sworn, says that at least ——— dollars' worth of work or improvements were performed or made upon [here describe the claim or claims, or part thereof] prior to the — day of ———, A. D. 18—, situate in ——— mining district, county of ———, Territory of Dakota. Such expenditure was made by or at the expense of ———, owner of said claim, for the purpose of holding said claim.

[Jurat.] [Signature.]

And such certificate, when recorded in the office of the register of deeds of the county wherein such claim is located, shall be *prima facie* evidence of the performance of such labor.

16. Relocating Abandoned Claims.—The relocation of abandoned lode claims shall be by sinking a new discovery shaft, and fixing new boundaries, in the same manner as if it were the location of a new claim; or the relocator may sink the original shaft, cut, or adit to a sufficient depth to comply with sections five and seven of this chapter, and erect new or adopt the old boundaries, renewing the posts if removed or destroyed. In either case, a new location stake shall be erected. In any case, whether the whole or part of an abandoned claim is taken, the location certificate must state that the whole or any part of the new location is located as abandoned property.

17. One Certificate, One Location.—No location certificate shall claim more than one location, whether the location be made by one or several locators; and if it purport to claim more than one location, it shall be absolutely void, except as to the first location therein described; and if they are described together, or so that it cannot be told which location is first described, the certificate shall be void as to all.

18. Fee for Recording.—The register of deeds shall be entitled to receive the sum of one dollar for each location certificate recorded and certified by him, and shall furnish the locator or locators with a certified copy of such certificate when demanded, for which he shall be entitled to receive fifty cents.

Revised Code of Dakota, 1877, p. 159.

Location of Lodes.

AN ACT *to amend Chapter 31 of the Political Code.*

Be it enacted, etc.

SECTION 1.—**Discoverer entitled to sixty days before recording.** That section 3 of chapter 31 of the Political Code be, and the same is hereby amended by striking out the word "twenty" where it occurs in the second line thereof, and inserting in lieu thereof the word "sixty."

SEC. 2.—**Name of locators.** That subdivision 2 of section 3 of said chapter be amended by adding after the word "locator" the words "or locators."

SEC. 3.—**Name of locators.** That section 5 of said chapter be amended by adding after the word "locator" where it appears in the fifth line thereof, the words "or locators."

SEC. 4.—**Marking boundaries.** That section 6 of said chapter be amended by adding after the word "claim" the following: "and plainly marked with the name of the lode and the corner, end or side of the claim that they respectively represent."

SEC. 5.—**Locators entitled to sixty days to perform labor.** That section 8 of said chapter be amended by striking out the word "thirty" and inserting in lieu thereof the word "sixty."

SEC. 6.—**Time of doing annual work.** That section 14 of said chapter be amended by adding at the end of said section the following: "*Provided*, That the period within which the work required to be done annually on all unpatented claims so located, shall commence on the first day of January succeeding the date of location of such claim."

SEC. 7. —That section 15 of said chapter be and the same is hereby repealed.

SEC. 8.—This act shall take effect and be in force from and after its passage and approval.

Endorsed.—Received at Executive Office, February 28, at 5:30 P. M.

NOTE BY THE SECRETARY OF THE TERRITORY.

The foregoing act having been presented to the Governor of the Territory for his approval, and not having been returned by him to the House of the Legislative Assembly in which it originated, within the time prescribed by the Organic Act, has become a law without his approval.

GEO. H. HAND,
Secretary of the Territory.

[Laws of 1881. p. 123.]

Liens.

AN ACT *to create a lien for miners and laborers in certain cases.*

Be it enacted, etc.

SECTION 1.—**Miner to have lien upon mine for work done or material furnished.** That every miner or other person who, at the request of the owner or owners, or his or their agents, of any lode, lead, ledge, mine or deposit bearing gold, cinnabar, or copper, or of any coal bank or mine, or at the request of any contractor or sub-contractor, shall perform any labor whatever on said mine, or furnish any timber, rope,

nails or any other materials for timbering shafts or levels for the mine owned by such owner or owners, or who shall furnish any kind of materials for erecting any windlass, whims, or any other hoisting apparatus or machinery, or for any car track, cars, tunnels, drifts or openings thereon, or shall perform any labor on any tunnel, shall have a lien upon such lode, lead, ledge, mine, deposit, bank or tunnel to secure the payment of the same.

SEC. 2.—**When labor is performed for contractor, owner to pay, when.** Every miner or other person doing and performing any work or furnishing any materials as specified in section one of this act under a contract, either express or implied, between the owner or owners of any mine, or his or their agent, and any contractor working on such mine, whether such work shall be performed or materials furnished as miner, laborer or otherwise, whose demand for work so performed or materials so furnished has not been paid, may deliver to the owner or owners of such mine or tunnel, or to his or their agent or superintendent, an attested account of the amount and value of the work and labor thus performed or of the materials thus furnished and remaining unpaid, and thereupon such owner or owners or his or their agent, shall retain out of the first subsequent payments to such contractor the amount so due for such work and labor, or materials furnished, for the benefit of the person so performing or purchasing the same.

[Sections 3 to 7 refer to mode of procedure—EDITOR.]

SEC. 8.—**This act to apply to oil wells, etc.** The provisions of this act shall apply to oil wells or springs, iron and lead mines, as well as all other mines not herein specified, so far as the same may be applicable.

SEC. 9.—This act shall take effect and be in force from and after its passage and approval.

Approved, February 1, 1879.

[Laws of 1879. p. 114.]

For law relative to water rights, see laws of 1881, p. 226, and for right of way and easements, p. 124, same session.

IDAHO.

Miners' Lien.

SEC. 12.—**Quartz Mine or Material.**—Every sub-contractor, journeyman, laborer, or other person, performing labor or furnishing materials for any contractor, in or upon any quartz claim, ledge, or mine, in working in the same or in the improvement or development thereof in the completion or performance of any contract entered into by any person in this Territory, every such person or persons so performing such labor or furnishing such material shall have a lien upon all the interest in such quartz claim, ledge, or mine, of the person or persons employing him or them, or purchasing such materials with the improvements thereon and appurtenances thereto belonging, and also upon all the interest of the person or persons for whom such person or persons acts as agent, or the owner or owners, for the value of such work, or labor or materials furnished, and all the provisions of this act shall apply in respect to recording, recovering, and enforcing such liens provided for in this section: *provided*, the person or persons claiming such lien shall within thirty days after the performance of such labor or furnishing such materials, give notice in writing to any person or persons, agent or agents, owner or owners, and shall within forty days file their lien in other respects as provided by this act.

SEC. 13.—**Quartz Mine or Ore.**—When any person or persons shall do or perform any work or labor in or upon or for any quartz claim, mine, or ledge, in working the same or in the improvement or development thereof; or in the preparation of the ores thereof for reduction; or in the hauling of the ores thereof; or shall perform labor or service as superintendent, manager, or foreman of any mine or ledge, or shall perform labor as a mechanic or artisan therefor; such person or persons shall have a lien upon all the interests in such quartz claim, ledge, or mine of the person or persons employing him or them, or purchasing such materials, together with the improvements thereon and appurtenances for the value of such work, labor, or services, or materials furnished, and all the provisions of this act respecting the filing, recording and recovering and enforcing mechanics' liens are made applicable to this section: *provided*, the person or persons claiming such liens shall, within sixty days after the completion of such work or labor, or rendering said services or furnishing said materials, file their lien in other respects as provided by this act.

SEC. 14.—**What is Included.**—This Act shall be so construed as to include in its provisions bridges, ditches, flumes, aqueducts to create hydraulic power for mining purposes, and all improvements on mining claims.—Extract from an Act approved Jan. 11, 1875. Laws of 1874–5, p. 615.

An Act to repeal the second section of an Act entitled "An Act relating to the discovery of gold and silver quartz lodes, and of the manner of their location," Approved January 12th, 1866.

Be it enacted, etc.

SECTION 1.—That the second section of an act entitled, "an act relating to the discovery of gold and silver quartz lodes, and the manner of their location," approved January 12th, 1866, be and the same is hereby repealed.

SEC. 2.—That all locations hereafter made, shall be made in conformity with, and pursuant to the provisions of the act of Congress of May 10th, 1872: *Provided*, That all locations made prior to the passage of this act, in accordance with the act of Congress of May 10th, 1872, are hereby legalized and confirmed: *Provided, further*, That nothing in this act shall be so construed as to invalidate the vested rights of discoverers and locators.

SEC. 3.—This act to take effect and be in force from and after its passage.

Approved February 21, 1879.

[Laws of 1879. p. 29.]

An Act relating to the location and recording of mining claims.

Be it enacted, etc.

SECTION 1.—The mining claims hereafter located upon veins or lodes of quartz or other rock in place bearing any of the precious or other metals mentioned in section 2,320 of the Revised Statutes of the United States, may extend to three hundred (300) feet on each side of the middle of the vein or lode; *Provided*, that when the locators have set the stakes, posts, or monuments, described in the next section to indicate the line of the vein, ledge, or lode, such stakes, posts or monuments shall be taken for the purposes of said location, to mark correctly the line thereof, and such line shall not be afterwards changed so as to affect the rights acquired or interfere with any locations made subsequently thereto.

SEC. 2.—The locators of any mining claim shall at the time of making the location place a substantial stake or post, not less than four (4) inches square or in diameter, at each end of the ground claimed, and as near as practicable along the course or line of the vein or ledge, and also a similar stake or post at each corner of the location. Such stakes or posts shall be at least four (4) feet high above the surface, and shall each be marked distinctly with the name of the claim. The notice of location hereinafter mentioned shall be conspicuously attached to one of said center end posts, so that the same may be easily read; or it shall be conspicuously posted in like manner at the point of discovery and prospecting work on the claim. Where stakes or posts cannot be conveniently had, well-built monuments of stone, of the like height above the surface, will answer the purpose of stakes or posts, but the notice must be so placed on the side of such monument as to be readily seen.

SEC. 3.—The notice shall contain the date of the location, the names of the locators, the name of the claim, ledge or lode, the quantity in feet claimed along the ledge or lode, the width claimed from the middle of

the vein, and shall also give such a description of the locality of the claim, by reference to natural landmarks or fixed objects, and contiguous claims, if there be any, as to render the situation of the same reasonably certain from the letter of the notice itself.

SEC. 4.—Every claim shall be recorded within fifteen (15) days from the time of the posting of the notice in the district in which the same is situated, or at the nearest office of the claim. For the convenience of prospectors and locators, the county Recorders of the several counties shall appoint a deputy at any place where he may deem it necessary, and at all places, more than ten (10) miles distant from an existing office, whenever ten or more mining locators interested shall petition for the appointment of such deputy. Upon the failure of any Recorder to make the appointment of a deputy for ten days after a petition in writing shall have been presented to him, the resident miners at such district may appoint temporarily one of their number to act as Recorder of the district, whose records shall be as valid as if made by a deputy, and whose records shall be entered by the Recorder as hereinafter required; *Provided*, that whenever at any time afterwards the Recorder shall appoint a deputy for such district or place, the authority of the person elected by the resident miners shall cease.

SEC. 5.—At the time of presenting a notice of location for record, or within five (5) days thereafter, one of the locators named in the same shall appear before the deputy, and make and subscribe an affidavit in writing on, or attached to the notice to be administered by said deputy, substantially in the following form, to wit:

Territory of Idaho, County of ———, *ss.* I, ———, do solemnly swear that I am acquainted with the mining ground described in the notice of location herewith, called the ——— ledge, lode, or claim, and that the ground and claim therein described, or any part thereof, has not, to the best of my knowledge and belief, been heretofore located according to the laws of the United States and of this Territory; or if so located, that the same has been abandoned or forfeited by reason of the failure of such former locators to comply in respect thereto, with the requirements of said laws.

Subscribed and sworn to before me, this —— day of ———, A. D., 18—. A. B. ———.

SEC. 6.—The notice herein required to be recorded is a copy of the notice placed upon the claim, or substantially a copy of the same. It shall be recorded by the deputy appointed for the district, or the person elected for that purpose, as above provided (when the legal fee therefor shall be tendered), in a book to be kept for that purpose. Said book shall be indexed, with the names of all locators arranged in alphabetical order, according to the first letter of the family or surname of each. The fee to be tendered for making such record, administering the oath to the locator and certifying the same, for indexing the names appearing upon the notice, and to include the recording of the notice by the Recorder, as hereinafter required, and the indexing by said Recorder, shall be three (3) dollars, which fee shall be equally divided between the Recorder and the deputy, or person acting under an election, as hereinabove provided; and no other or additional sum of money shall be demanded or received by either or any of them for any services connected with the recording of any notice of location made pursuant to the requirements of this act.

SEC. 7.—The Deputy Recorder of mining claims of each district, or the person elected, as hereinabove provided, to make the record in case of the failure of the Recorder to appoint a deputy, shall, at least once in each month, transmit to the Recorder, at the county seat, all the notices of location filed with him for record, and not previously transmitted, which shall at once be recorded by said Recorder, in a book to be kept in his office, and be known as the book of mining claims. The names of all persons appearing in every notice of location shall be indexed by the Recorder, said names being arranged in said index in alphabetical order, according to the first letter of the surname of said locators.

SEC. 8.—The Deputy Recorders provided for in this act shall not, by virtue of the provisions hereof, be authorized to perform any other than the special duties herein specified. They shall keep an official seal, and the records in their custody shall be public records, but the seal of a Deputy Recorder shall not be attached to any paper except for the purpose of authenticating certificates attached to transcripts of the records in his custody as Deputy Recorder.

SEC. 9.—Any person who shall wilfully and maliciously tear or take down or destroy any notice posted on any claim, or remove or take down any stake, post or monument, placed or erected for the purpose of marking or indicating any mining claim or the line of the vein, ledge or lode, with the intent to destroy or impair the evidence of such location, shall be deemed guilty of a misdemeanor, and on conviction thereof, before any Justice of the Peace of the county, may be punished by fine in any sum not exceeding one hundred (100) dollars, or imprisonment in the county jail not exceeding six months, or by both such fine and imprisonment.

SEC. 10.—An act relating to the discovery of gold and silver quartz lodes and the manner of their location, approved January 12, 1866; an act supplemental to and amendatory of said act, approved January 4, 1877; an act relating to the recording of quartz claims in Owyhee and Alturas counties, and fixing the fees thereof, approved January 15, 1875; an act relating to the discovery of gold and silver quartz lodes in Lemhi county and the manner of their location, approved January 9, 1877; an act relating to the discovery of gold and silver quartz lodes in Lemhi county and the manner of their location, approved February 21, 1879, and all other acts and parts of acts in conflict or inconsistent with the provisions of this act, are hereby repealed.

SEC. 11.—This act shall take effect and be in force from and after the passage thereof.

Approved February 10, 1881.

[Laws of 1881, p. 262.]

For laws relating to right of way, easements, etc., see acts of January 12, 1877, and January 7, 1881; and as to water rights, see act of February 10, 1881.

MONTANA.

An Act in Relation to Quartz Claims.

Be it enacted by the Legislative Assembly of the Territory of Montana:

SECTION 1.—**Filing a Declaratory Statement.**—Any person or persons who shall hereafter discover any mining claim upon any vein or lode bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposits, shall, within twenty days thereafter, make and file for record in the office of the recorder of the county in which said discovery is made, a declaratory statement thereof, in writing, on oath, before some person authorized by law to administer oaths, describing such claim in the manner provided by the laws of the United States.

SEC. 2.—**Crevice Must be Discovered.**—That in order to entitle any person or persons to record in the county recorder's office of the proper county, any lead, lode, or ledge, there shall first be discovered on said lode, lead, or ledge, a vein or crevice of quartz, or ore, with at least one well-defined wall.

SEC. 3.—**Dimensions of Location.**—Claims on any lead, lode, or ledge, bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposits, hereafter discovered, shall consist of not more than fifteen hundred linear feet along the lead, lode, or ledge, and not more than three hundred feet, and not less than twenty-five feet, on each side from the centre of said lead, lode, or ledge, for working purposes. *Provided*, That the provisions of this act shall not be so construed as to include claims recorded prior to the passage of this act.

SEC. 4.—**Lode Claims Heretofore Discovered.**—All lode claims heretofore discovered and recorded pursuant to the law, and the possessory title to which shall have been preserved according to law, shall entitle the owner or owners thereof to surface ground along the course of the vein three hundred feet on each side from the center of said vein. *Provided*, That such width shall not be permitted to interfere with any vested possessory rights of any person or persons, corporation or corporations, which have intervened and have been preserved to the time of the taking effect of this act; but parties desiring to avail themselves hereof shall so signify by a record which shall show that they so elect, or if they so desire, they may limit the surface ground on each side of the centre of the vein to any width not less than twenty-five feet.

SEC. 5.—**Punishment for Destroying Notice and Monument.**—Any person who shall remove any stake or monument placed on any mining claim, or who shall obliterate, deface or destroy any notice placed thereon, shall be deemed guilty of a misdemeanor, and on conviction thereof, shall be punished by fine not exceeding one hundred dollars, or imprisonment not exceeding one year, or both such fine and imprisonment, in the discretion of the court.

SEC. 6.—**Repeal.**—All acts and parts of acts in conflict with this act are hereby repealed.

SEC. 7.—**Takes Effect.**—This act to take effect and be in force from and after its passage. Approved, February 11, 1876. [Laws of 1876, p. 127.]

SEC. 40.—**Statute of Limitations.**—No action for the recovery of mining claims (lode claims excepted), or for the recovery of possession thereof, shall be maintained, unless it appear that the plaintiff or his assigns was seized or possessed of such mining claims within one year before the commencement of such action. [Laws of 1877, p. 48.]

SEC. 363.—**Customs as Proof.**—In actions respecting mining claims, proof must be admitted of the customs, usages, or regulations established and in force at the bar or diggings embracing such claim; and such customs, usages, or regulations, when not in conflict with the laws of this territory, must govern the decision of the action. [Laws of 1877, p. 139.]

Other laws of Montana, relating to Rights of Way, Easements, Tunnels, Aliens, etc., are found in Codified Statutes, 1871–2, pp. 308, 522, 524, 525, 593, 597; Laws of 1873, pp. 35, 83, and Laws of 1874, pp. 94, 97.

An Act Concerning Records of Placer Mining Locations.

Be it enacted, etc.

SECTION 1.—That section 873 of the Fifth Division of the Revised Statutes of Montana be and the same is hereby amended to read as follows:

Section 873. Any person or persons who shall hereafter discover any mining claim upon any vein or lode, bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposits, or who shall hereafter discover or locate any placer deposit of gold, or other deposit of minerals, including building stone, limestone, marble, coal, salines, and saline springs, clay, sand or other mineral substance having a commercial value, shall, within twenty days thereafter, make and file for record in the office of the Recorder of the county in which said discovery or location is made, a declaratory statement thereof, in writing, on oath made before some person authorized by law to administer oaths, describing such claim in the manner provided by the laws of the United States.

SEC. 2.—All records of placer mining locations, or locations of valuable mineral deposits, which have heretofore been made in the county records of the county in which the same may be situated, shall have the same force and effect as though such record had been authorized by law, except in cases where the rights of third persons had been acquired before the passage of this act, and such records shall be admitted in evidence before any court in the same manner as the records of location of quartz or lode mining claims; *Provided, further*, That the provisions of this act shall only be construed to impart notice to the public of such claim, but no person shall, by reason of this act, acquire any or further rights.

Approved March 5, 1883.

[Laws of 1883. p. 95.]

Other laws of Montana, relating to Rights of Way, Easements, Tunnels, Aliens, etc., are found in Codified Statutes, 1871–2, pp. 308, 522, 524, 525, 593, 597; Laws of 1873, pp. 35, 83, and Laws of 1874, pp. 94, 97; Laws of 1879, p. 52; Laws of 1883, pp. 26, 267. Also Code of Civil Procedure, sections 143, 486, 815.

NEVADA.

Certain County Recorders.

CHAP. LXXII.—*An Act to provide for the better preservation of the Mining Records in certain Mining Districts in this State.*

The people, &c., do enact as follows:

SECTION 1.—**District Mining Recorder.**—In every mining district in this State in which the seat of government of any county is situated, the county recorder of said county shall be *ex-officio* District Mining Recorder, subject, in the discharge of his duties, to such rules, regulations, and compensation, as may be now in force or hereafter prescribed by the mining laws of the mining districts respectively to which this Act is applicable. He shall, as such *ex-officio* Mining Recorder, be responsible on his official bond for the faithful performance of the duties of his office, and the correct and safe keeping of all the records thereof.

SEC. 2.—**Take Effect.**—This act shall take effect and be in force from and after the first day of August, A. D. 1880.

Approved March 6, 1879.

[Laws of 1879, p. 80.]

An Act in Relation to the Sale of Certain Lands Granted by the United States to the State of Nevada.

The People do enact as follows:

SECTION 1.—All timber and mountainous grazing lands hereafter selected by and listed to the State of Nevada, under any grant made by the United States to this State, shall be sold, reserving the minerals therein contained, and the right to dispose of mining claims on such timber and mountainous grazing lands in the manner prescribed by the laws of Congress in relation to the disposal of mineral lands and mining claims, and such reservation and right of disposal shall be expressed in all patents hereafter granted and issued by the State for such timber and mountainous grazing lands to purchasers thereof from the State.

SEC. 2.—When any minerals shall be discovered on any timber and mountainous grazing lands sold and patented by the State, the State hereby reserves and shall have the right to convey mining claims thereon, in the same manner and of the same amount in any one claim as is now the law and practice of the United States, and the right of way over any such timber and mountainous grazing lands, to and from such mining claims, is hereby reserved, and shall be granted to the grantee of any such mining claim.

SEC. 3.—All acts and parts of acts, so far as in conflict with the provisions of this act, are hereby repealed.

Approved March 1, 1883.

[Laws of 1883. p. 103.]

For law for Lien to Miners, see laws of 1881, p. 49.

NEW MEXICO.

An Act to Regulate the Manner of Locating Mining Claims, and for Other Purposes.

Be it enacted by the Legislative Assembly of the Territory of New Mexico:

SECTION 1.—**Locations.**—That any person or persons desiring to locate a mining claim upon a vein or lode of quartz, or other rock in place, bearing gold, silver, cinnabar, lead, tin, copper, or other valuable deposit, must distinctly mark the location on the ground, so that its boundaries may be readily traced; and post in some conspicuous place on such location a notice in writing, stating thereon the name or names of the locator or locators, his or their intention to locate the mining claim, giving a description thereof by reference to some natural object or permanent monument as will identify the claims; and also, within three months after posting such notice, cause to be recorded a copy thereof in the office of the recorder of the county in which the notice is posted; and *Provided*, No other record of such notice shall be necessary.

SEC. 2.—**Record-Books and Fees.**—In order to carry out the intent of the preceding section, it is hereby made the duty of the probate judges of the several counties of this Territory, and they are hereby required to provide, at the expense of their respective counties, such book or books as may be necessary and suitable, in which to enter the record hereinbefore provided for. The fees for recording such notices shall be ten cents for every one hundred words.

SEC. 3.—**Value of Labor.**—That in estimating the worth of labor required to be performed upon any mining claims, to hold the same by the laws of the United States in the regulation of mines, the value of a day's labor is hereby fixed at the sum of four dollars: *Provided, however*, That in the sense of this statute, eight hours of labor actually performed upon the mining claim shall constitute a day's labor.

SEC. 4.—**Prior Locations Confirmed.**—All locations heretofore made in good faith, to which there shall be no adverse claims, the certificates of which locations have been or may be filed for record, and recorded in the recorder's office of the county where the location is made within six months after the passage of this act, are hereby confirmed and made valid. But where there may appear to be any such adverse claims, the said location shall be held to be the property of the person having the superior title or claim, according to the laws in force at the time of the making of the said locations.

SEC. 5.—**Ejectment.**—An action of ejectment will lie for the recovery of the possession of a mining claim, as well also of any real estate, where the party suing has been wrongfully ousted from the possession thereof, and the possession wrongfully detained.

SEC. 6.—**Repeal of Prior Acts.**—That "An act concerning mining claims," approved January 18, 1865, and an act amendatory thereof, approved January 3, 1866; also, an act entitled "An act to amend certain acts concerning mining claims in the Territory of New

Mexico," approved January 1, 1872, be, and the same are hereby, repealed: *Provided*, That no locations completed or commenced under said acts, shall be invalidated or in any wise affected by such repeal.

SEC. 7.—**Becomes Effective.**—That this act shall take effect and be in full force from and after its passage.

Approved January 11, 1876.

[Laws of New Mexico, 1875–6, p. 116.]

An Act in Relation to Lode Claims.

SECTION 1.—Hereafter, in actions respecting mining claims, proof must be admitted of the customs, usages or regulations established and in force in the mining district embracing such claims, and such customs, usages or regulations, when not in conflict with the laws of this territory, or the United States, must govern the decision of the action.

SEC. 2.—Any person or persons claiming or staking upon the surface ground of the mining claim of another who has complied with all laws, regulations and customs, shall be guilty of a misdemeanor, and upon conviction thereof, shall be fined in any sum not less than ten nor more than one hundred dollars, or imprisonment in the county jail for not less than ten nor more than ninety days, or both, at the discretion of the court.

SEC. 3.—Any person or persons who now have their stakes, monuments or notices upon the surface ground of any mining claim belonging to others, shall within sixty days from the passage of this act, remove such stakes, monuments or notices from the surface ground of such mining claim, and upon failure to do so shall be subject to the penalties set forth in section two of this act.

SEC. 4.—Within sixty days after the period fixed by the United States laws for doing the annual assessment upon mining claims, all persons owning or representing any mining claim or claims shall file with the county and district recorder an affidavit stating that the full amount has been expended as required by law. Such affidavit shall be signed by at least two parties disinterested in such claim or claims. Failure to file such affidavit as herein required shall be considered *prima facie* evidence of abandonment of such claim or claims; and, *Provided*, That the fee of each recorder shall not exceed fifty cents for each certified record.

All laws and parts of laws in conflict with this act are hereby repealed.

This act shall be in full force and effect from and after the first day of April, A. D. 1882.

Approved March 1, 1882.

[Prince's Supplement. p. 673.]

OREGON.

Location, Establishment, and Record of Claims.

CHAPTER XXXVIII.—*Miscellaneous Laws.*

SEC. 1.—**Length and Width.**—That any person or company of persons, establishing a claim on any quartz lead containing gold, silver, copper, tin, or lead, or a claim on a vein of cinnabar, for the purpose of mining the same, shall be allowed to have, hold, and possess the land or vein with its dips, spurs, and angles, for the distance of three hundred feet in length, and seventy-five feet in width, on each side of such lead or vein. [Amended. See Act of 1880 following.]

SEC. 2.—**How Established.**—To establish a valid claim, the discoverer or person wishing to establish a claim shall post a notice on the lead or vein, with name or names attached, which shall protect the claim or claims for thirty days; and before the expiration of said thirty days, he or they shall cause the claim or claims to be recorded as hereinafter provided, and describing as near as may be the claim or claims, and their location; but continuous working of said claim or claims shall obviate the necessity of such record. If any claim shall not be worked for twelve consecutive months, it shall be forfeited, and considered liable to location by any person or persons, unless the owner or owners be absent on account of sickness or in the service of their country in time of war. [See United States Law.]

SEC. 3.—**Number of Claims Held and Owned.**—Any person may hold one claim by location, as hereinafter provided, upon each lead or vein, and as many by purchase as the local laws of the miners in the district where such claims are located may allow; and the discoverer of any new lead or vein, not previously located upon, shall be allowed one additional claim for the discovery thereof. Nothing in this section shall be so construed as to allow any person, not the discoverer, to locate more than one claim upon any one lead or vein.

SEC. 4.—**Annual Labor.**—Every person or company of persons, after establishing such claim or claims, shall, within one year after recording or taking such claim or claims, work or cause to be worked, to the amount of fifty dollars for each and every claim, and for each successive year shall do the same amount of work, under the penalty of forfeiture of said claim or claims; *Provided*, That any incorporate company owning claims on any lead or vein, may be allowed to work upon any one claim, the whole amount required as above, for all the claims they may own on such lead or vein. [See United States Law.]

SEC. 5.—**Duty of County Clerks.**—It shall be the duty of the county clerk of any county, upon the receipt of notice of a miners' meeting, organizing a miners' district in said county, with a description of the boundaries thereof, to record the same in a book, to be kept in his office, as other county records, to be called a "Book of Record of Mining Claims;" and upon the petition of parties interested, he may appoint a deputy of such district, who shall reside in said district or its vicinity, and shall record all mining claims and water rights, in the order in which they are presented for record, and shall transmit a copy

of such record, at the end of each month, to the county clerks, who shall record the same in the above-mentioned book of record, for which he shall receive one dollar for each and every claim. It shall further be the duty of said county clerk to furnish a copy of this law to his said deputy, who shall keep the same in his office, open at all reasonable times for the inspection of all persons interested therein.

SEC. 6.—**Placer Claims and Town Lots.**—Miners shall be empowered to make local laws in relation to the possession of water rights, the possession and working of placer claims, and the survey and sale of town lots in mining camps, subject to the laws of the United States.

SEC. 7.—**Ditches and Flumes.**—That ditches used for mining purposes, and mining flumes permanently affixed to the soil, be and they are hereby declared real estate, for all intents and purposes whatever.

SEC. 8.—**Real Estate Laws.**—That the laws relative to the sale and transfer of real estate, and the application of the liens of mechanics and laborers therein, be and they are hereby made applicable to said ditches and flumes; *Provided,* That all interests in mining claims, known as placer or surface diggings, may be granted, sold, and conveyed by bill of sale, and delivery of possesion, as in cases of the sale of personal property; *Provided, further,* That the bills of sale or conveyances, executed on the sale of any placer or surface mining claim, shall be recorded within thirty days after the date of such sale, in the office of the county clerk of the county in which such sale is made, in a book to be kept by the county clerk for that purpose, to be called the record of conveyances of mining claims. [See Act of 1880 following.]

SEC. 9.—**Mortgages on Placer Claims.**—Mortgages of interests in placer or surface mining claims shall be executed, acknowledged, recorded, and foreclosed as mortgages of chattels. [See Act of 1880 following.]

SEC. 10.—**Fee of County Clerk.**—The county clerk shall be entitled to a fee of one dollar each, for every conveyance or mortgage recorded under the provisions of this act.

[General Laws of Oregon 1845–1864, p. 813; 1843–1872, p. 686.]

Lodes, Placers, and Water Rights.

AN ACT *to amend Section 1 of Chapter 38 of the Miscellaneous Laws of Oregon, pertaining to mines, as compiled by M. P. Deady and L. F. Lane.*

Be it enacted by the Legislative Assembly of the State of Oregon:

SECTION 1.—**Length and Width of Lode Claims.**—That section 1 of Chapter 38 of the Miscellaneous Laws of Oregon pertaining to mines, as compiled by Matthew P. Deady and Lafayette Lane, be amended so as to read as follows: That any person or company of persons, establishing a claim on any quartz lead containing gold, silver, copper, tin, or lead, or a claim on a vein of cinnabar, for the purpose of mining the same, shall be allowed to have, hold, and possess the land or vein, with all its dips, spurs, and angles, for the distance of fifteen hundred feet in length and three hundred feet in width on each ide of such lead or vein.

SEC. 2—**Mining District Laws.**—That all local laws and regula-

tions now existing in the mining districts of this State that have not been made within two years next preceding the passage of this Act, shall be, and the same are hereby, declared null and void.

SEC. 3.—**Work on Placer Claims.**—That from and after the passage of this act, any person, company, or corporation owning placer claims, composed of creek, bench, and hill claims, joining, may represent the whole of said claims by working or mining on any one of the same.

SEC. 4.—**Representation and Abandonment of Placer Claims.**—That from and after the passage of this act, any person or persons, company or corporation, shall be allowed to represent his or their placer claims, ditches and water rights, as may best suit his or their convenience; *Provided*, that whenever any person, company or corporation, being the owner of any placer mining claim or claims, ditches, and water rights, have or shall abandon the same, and who shall for one year thereafter cease to exercise ownership over said claims, ditches, and water rights, shall be deemed to have lost all title, claim, or interest therein.

SEC. 5.—**Laws Governing Placer Claims and Water Rights.**—That whenever any person, company, or corporation have or shall locate a placer claim or claims in conformity to the Act of Congress approved May 10, 1872, and the amendments thereto, the said claim or claims, together with all ditches and water rights appurtenant to, and connected with the same, shall not be subject to any local law or regulation of the mining district in which the same may be situated, but shall thereafter be subject only to the law governing real estate.

Approved October 25, 1880.

[Laws of 1880, p. 26.]

UTAH.

Of Mines and Mining.

AN ACT *to provide rules for the working and development of mines.*

[*Approved February 16, 1872.*]

(1218) SECTION 1.—**Location of Claim.**—Be it enacted by the Governor and Legislative Assembly of the Territory of Utah: That any citizen of the United States, and any person who shall have declared his intention to become such, who shall hereafter discover any mineral deposit, lead, or lode, bearing gold, silver, tin, platina, copper, or cinnabar, shall be entitled to one claim thereon, by right of discovery, and one claim by right of location: *Provided*, That no person shall be entitled to more than one claim by right of location, on any one lead or lode. [See United States Law.]

(1219) SEC. 2.—**Defacing Notices, etc.**—Any person or persons who shall willfully or maliciously tear down or deface a notice posted on any mining claim, or take up or destroy any stake or monument, marking any such claim, or interfere with any person lawfully in possession of said claim, or who shall alter, erase, deface, or destroy any record kept by a mining recorder, shall be guilty of misdemeanor, and upon conviction thereof shall be punished by a fine of not less than twenty-five nor more than one hundred dollars, or by imprisonment for not less than ten days nor more than six months, or by both such fine and imprisonment. Justices of the Peace, in their respective counties, shall have jurisdiction of such offences.

(1220) SEC. 3.—**Wrongfully Extracting Ores.**—Any person wrongfully entering upon any mine or mining claim, and carrying away ores therefrom, or extracting or selling ores from any mine, being the property of another, shall be liable to the owner or owners of said ore for three times the value thereof, recoverable by an action at law; and should the plaintiff file his affidavit that the defendant did unlawfully take such ores, the defendant may be arrested and held to bail, as in cases for the recovery of the possession of personal property unjustly detained.

(1221) SEC. 4.—**Miner's Lien.**—Any person or persons who shall perform any work or labor upon any mine, or furnish any material therefor, in pursuance with any contract made with the owner or owners of such mine, or of any interest therein, shall be entitled to a miner's lien for the payment thereof upon all the interest, right, and property in such mine, by the person or persons contracting for such labor or materials at the time of making such contract; said lien may be enforced in the same manner and with the same effect as a mechanic's lien, as provided by the laws of *Utah*.

Records and Mining Rules.

AN ACT *in relation to proving the records and mining rules and regulations of the mining districts of the Territory, and for other purposes.*

[*Approved February 18, 1876.*]

(1222) SECTION 1.—**Location Notices.**—Be it enacted by the Governor and Legislative Assembly of the Territory of Utah: That copies of notices of location of the mines, lodes, and veins, and of tunnel sites recorded in the several mining districts, and of the mining rules and regulations in force in the several districts, in like manner recorded, shall be receivable in all the courts of this Territory, as *prima facie* evidence of such notices, rules, and regulations: *Provided*, The recorder of the district shall certify under his hand and seal that such copies are full, true, and perfect copies from the records in his custody. The seal of the office of the mining recorder so certifying, affixed to such certificate, shall be *prima facie* evidence of the fact of the election and qualification and official character of such mining recorder.

(1223) SEC. 2.—**County Recorders.**—It shall be the duty of the county recorder of the several counties of this Territory, to record the mining rules and regulations of the several mining districts in their respective counties; and when so recorded, certified copies thereof shall be received in all the courts of this Territory, as *prima facie* evidence of such rules and regulations.

(1224) SEC. 3.—**Fees.**—The mining recorders of the several mining districts shall be allowed the same fees for recording and making copies of any records in their custody as are now allowed by law for like services to county recorders. And it shall be the duty of each mining recorder, upon request and payment or tender of the fees therefor, to make and deliver to any person requesting the same, duly certified copies of any records in his custody; and for a failure so to do, or for receiving larger fees for any such service than those herein provided, such mining recorder shall be deemed guilty of a misdemeanor, and, upon conviction thereof, shall be subjected to the same penalties provided against public officers in section twenty of the act entitled, "An act to regulate fees and compensation for official and other services in the Territory of Utah," passed February 20, 1874.

(1225) SEC. 4.—**District Records and Recorders.**—Recorders of mining districts shall, for the purpose of this act, be deemed public officers, and the records in their custody shall be deemed public records, and they are hereby required to keep an official seal.

[Compiled Laws of Utah, pp. 398, 399, 400.]

WYOMING.

Development of Mining Resources.

AN ACT *to provide for the development of the Mining Resources of the Territory of Wyoming.*

Be it enacted by the Council and House of Representatives of the Territory of Wyoming:

SECTION 1.—**Expenditure—Abandonment.**—Any person or persons who shall have performed work or made improvements or expenditures to the amount of one thousand dollars on any lead, lode, or ledge, the same shall not be subject to relocation under the laws of this Territory; *Provided*, That such quartz claim or claims shall not be abandoned, but shall be represented by the person or persons owning such claim or claims, or by his or their agent or attorney, who shall reside within the district in which such claim or claims may be situated, unless driven from said district by Indians. [See United States Law.]

SEC. 2.—**Salting Mines or Ores.**—Any person or persons who shall defraud, cheat, or swindle any party or parties by what is known as "salting," that is, by placing or causing to be placed in any placer or quartz claim, or dirt, gravel, or quartz contained therein, any gold, silver, or metals, or minerals which would prove to be a misrepresentation, thereby working injury or loss to any party or parties, shall be deemed guilty of a felony, and, upon conviction thereof, shall be fined in any sum not to exceed five thousand dollars and not less than fifty dollars, together with the cost of prosecution, and may be imprisoned in the territorial penitentiary not more than three years or less than thirty days, or both such fine and imprisonment.

SEC. 3.—**Delinquent Co-Owners.**—When parties owning in partnership any claim or claims, or any lead, lode, or ledge, or any one of the parties so owning, shall fail to perform his or her portion of the work, for the period of eight months, or pay the reasonable assessment for the same when said claim is being worked in accordance with the expressed wish of a majority of the persons owning such claim, it may be sold to pay such assessment by the person or persons to whom such assessment may be due, by giving thirty days' notice, published in the nearest newspaper, and by posting notice for thirty days on such claim, giving the amount of assessment due, date of notice, and date of sale. [See United States Law.]

SEC. 4.—**Exception to Residents.**—The provision of the foregoing section shall not apply to persons residing within the district in which his or her property is situated.

SEC. 5.—**Redemption of Sold Interest.**—Any property sold to pay assessments may be redeemed within the period of six months by the person or persons formerly owning such property, or by his or her agents, heirs, or attorneys, by paying the cost of advertising and sale, together with the assessments due, and ten per cent. upon all purchase-money for the same.

SEC. 6.—**Repeal Provision.**—All acts and parts of acts conflicting with this act be, and the same are, hereby repealed.

SEC. 7.—**When to Take Effect.**—This act shall take effect and be in force from and after its passage.

Approved December 16th, 1871.

Laws of 1871, p. 114.

Miners' Liens.

SEC. 1.—**When Created.**—That every miner or other person, who, at the request of the owner of any ledge or lode of quartz bearing gold, silver, cinnabar, or copper, or of any coal bank or mine, shall work in or upon such mine or bank, shall have a lien upon such vein or lode, mine or bank, to the amount due at any time when a demand shall be made upon such owner, or his or their agent, for money due for such labor, and payment shall be refused.

SEC. 2.—**Materials.**—That any person who shall labor as a mechanic, or otherwise, or who shall furnish timber, lumber, rope, nails, or any other material for timbering shafts [or] levels for the mine, who shall furnish any kind of materials for erecting windlass, whim, or other hoisting apparatus upon any vein, mine, or coal bank, referred to in the first section, shall also have a lien upon the mine or coal bank for which he furnished such materials, or upon which he performed such labor.

SEC. 3.—**Manner of Proceeding.**—The party seeking a lien shall proceed, so far as the proceedings are applicable in the same manner, to enforce a lien as by law required in the case of mechanics and other persons seeking to enforce a lien upon dwelling-houses and other buildings, except when other provisions are made by this Act.

SEC. 4.—**Notice How and When Filed.**—When any sum exceeding ten dollars for labor performed by any miner or other person upon or in any mine or coal bank specified in section one of this Act, shall be due and unpaid for ten days, it shall be competent for the person or persons to whom such sum of money shall be due, to file a notice in the office of county recorder in the county where such mine is situated, at any time within thirty days after the last day upon which work was done by him; which said notice shall in substance set forth the fact that the party performed labor (naming the kind) for a party or company (naming the party or company), that such labor was performed under a contract (stating the substance); also, the time when the party commenced and when he ceased to work, the amount still due and unpaid, together with a description of the mine or coal bank upon which such work was performed, which statement shall be verified by the affidavit of the party so filing it, and when filed, the county recorder shall record the same in a "lien-book," the same as required in the case of mechanics' notices of liens.

SEC. 5.—**Materials Furnished.**—The provisions of the next preceding section shall apply to persons who shall furnish materials or work upon any shaft, whim, or other hoisting works, who, by complying with the general provisions of such section, shall have a like lien.

SEC. 6.—**Lien Holds Against Purchasers.**—When notices as provided in the next two preceding sections shall be filed, the lien shall hold not only against the owner of the mine or bank, from the time when the miner or other person began work, but against all persons or company who shall have purchased such mine or coal bank

while such miner or other person was employed therein, or furnished materials used therein or thereon.

SEC. 7.—**When Suit May Be Commenced.**—Suit to enforce such lien may be commenced at any time within one year after filing such notice.

SEC. 8.—**Oil Well or Spring.**—Any owner of any oil well or spring who shall employ any person to perform any work of any kind around or about any oil well or spring, either in building derricks, buildings, or any kind of machinery, or in boring or drilling, shall be deemed within the provisions of this Act; and all persons performing labor or furnishing materials, shall have like liens upon oil territory upon which he labored, or for which he furnished materials or the improvements thereon, as miners or other laborers upon or in mines as provided in this Act, and shall proceed in the same manner to enforce a lien.

SEC. 9.—**Takes Effect.**—This act shall take effect and be in force from and after its passage.

Approved December 2d, 1869.

Laws of 1869, p. 404.

Mining Resources.

AN ACT *to amend an act entitled "An Act to provide for the development of the mining resources of the Territory of Wyoming."*

Be it enacted, etc.

SECTION 1.—That section one of an act entitled "An Act to provide for the development of the mining resources of the Territory of Wyoming," approved 16th December, 1871, be and the same is hereby amended as follows: By inserting the words "or placer claims" after the word "ledge" in the third line of said section, also by inserting the words "or placer" after the word "quartz" in the fifth line of the said section, as said section is printed in the Compiled Laws of Wyoming.

SEC. 2.—That section three of the said act be and the same is hereby amended by striking out the word "thirty" in the eighth line of said section, and inserting the word "ninety" instead in said eighth line as printed in the Compiled Laws of Wyoming.

SEC. 3.—This act shall take effect and be in force from and after its passage.

Approved March 10, 1882.

[Laws of 1882. p. 156.]

Mining Districts—Laws Relating Thereto.

AN ACT *to provide for the preservation of the records, laws and proceedings of mining districts, and their use as evidence.*

Be it enacted, etc.

SECTION 1.—That a copy of all the records, laws and proceedings of each mining district, so far as they relate to lode claims, shall be filed in the office of the Register of Deeds of the county in which the district is situated, within the boundaries attached to the same, which shall be taken as evidence in any court having jurisdiction in the matters concerned in such record or proceeding; and all such records of deeds and conveyances, laws and proceedings of any mining district heretofore filed in the register's office of the proper county, and transcripts thereof duly

certified, whether such record relate to gulch claims, lode claims, building lots, or other real estate, shall have the like effect in evidence.

SEC. 2.—It shall be the duty of the Recorder of each mining district to file copies as above provided, and reasonable fees therefor may be provided by the several mining districts.

SEC. 3.—This act shall take effect from and after its passage.

Approved November 26, 1879.

[Laws of 1879. p. 115.]

Preservation of Records.

AN ACT *to amend an act entitled "An Act to provide for the preservation of the records, laws, and proceedings of mining districts and their use in evidence."*

Be it enacted, etc.

SECTION 1.—That section one of an act entitled "An Act to provide for the preservation of the records, laws and proceedings of mining districts and their use in evidence," approved November 26th, 1879, be and the same is hereby amended by striking out of the second and third lines thereof, as they appear in the Session Laws of 1879, the words "so far as they relate to lode claims," and that said section one be further amended by adding thereto the words as follows: "Such copies of records, laws and proceedings, shall be filed in the office of the said Register of Deeds by the recorder of each mining district within thirty days after the organization of each new mining district, and there shall be filed in the office of the said Register of Deeds by the said recorder, during the first week of each month, complete copies of all the records, laws and proceedings made, enacted and had in each mining district during the preceding month.

SEC 2.—This act shall take effect and be in force from and after its passage.

Approved March 9, 1882.

[Laws of 1882. p. 157.

DETERMINATION OF MINERALS.

Chemical Elements.

Ninety-nine hundredths of the earth's crust is composed of less than sixteen elements and their chemical and physical compounds. An element is a primary substance. It cannot be made by uniting different things, nor can it be separated into anything unlike itself. A compound is made up of two or more elements. A chemical compound generally is one wherein the things composing it are so changed as not to be recognized by one or more of the senses of sight, taste, touch, or smell. A physical compound generally is one wherein the substances composing it are unchanged, or so slightly changed as to be observed without difficulty. To illustrate, water is the chemical union of air* and hydrogen, invisible gases. Common salt is a white substance composed chemically of a green gas (chlorine) and a silvery metal (sodium). On the other hand, if salt and iron filings be placed together and thoroughly mixed, the eye can easily tell the iron from the salt. If sugar be dissolved in a cup of water, the water looks unchanged, and the sense of taste can detect the sugar. The first two are chemical compounds, the last two physical.

Thirty-six Elements.†

Non-metallic Elements. Gases.—Oxygen, Hydrogen, Nitrogen, Chlorine, Fluorine. *Liquid.*—Bromine. *Solids.*—Silicon, Carbon, Sulphur, Phosphorus, Iodine, Boron.

Metals and Metalloids.—Gold, Silver, Copper, Mercury (Quicksilver), Lead, Tin, Zinc, Nickel, Iron, Aluminium, Antimony, Arsenic, Barium, Bismuth, Cadmium, Calcium, Chromium, Cobalt, Magnesium, Manganese, Platinum, Potassium, Sodium, Strontium.

Very few elements are found pure in the earth. Nearly all occur as compounds.

Oxygen is the great compounder. Oxygen one-fifth, mixed with nitrogen four-fifths, makes the air about us. It chemically unites with every known element except fluorine, forms one-half the earth's crust, eight-ninths of water, four-fifths of vegetables (by weight), and three-fourths of animals (by weight).

Oxygen united with the non-metallic elements forms Acids,† viz., Sulphuric Acid, Nitric Acid. With the other elements it forms Bases. Acids and Bases united, form most of the Minerals. Chemical composition is indicated by the use of *ide* and *ate*. *Ide* indicates the union of two elements. *Ate* shows at least three elements, one of which is oxygen.

Sodium Chloride (salt) is a union of sodium and chlorine. Silver Sulphide, sulphur and silver. Copper Oxide, copper and oxygen. Iron Sulphate (green vitrol) shows that oxygen is united with iron and sulphur. Calcium Carbonate (limestone) is composed of calcium, carbon and oxygen.

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* Oxygen in the air.

† About seventy elements are recognized by chemists.

† Acids and bases require water to complete them.

Hydrogen forms one-ninth part of water. This gas is the lightest of known substances. It burns freely with a bluish flame.

Nitrogen makes 80 per cent. of the atmosphere, yet by itself destroys animal life.

Chlorine is 2½ times as heavy as air, and united with sodium, forms common salt. It is a useful element in other compounds.

Fluorine forms with calcium fluor spar, and with hydrogen hydrofluoric (fluohydric) acid, used to etch on glass.

Silicon combined with oxygen, forms silica or quartz.

Carbon, pure, is a solid, and forms the principal part of coal, plumbago and bitumen. Charcoal is almost pure carbon. Diamond is pure carbon crystallized. United with oxygen it forms carbonic acid, and this acid, in combination, forms a class of minerals called carbonates. Limestone is carbonate of lime.

Sulphur is a yellow brittle solid. It is most abundant in volcanic regions. Combined with metals, it forms a class of minerals called sulphurets or sulphides.

Phosphorus is a white, waxy substance. It is quite abundant in nature in combinations. With lime and oxygen it forms the phosphate of lime.

Aluminium is found only in compounds. With oxygen it forms alumina, of which the gems ruby and sapphire are pure specimens. It largely constitutes clay and feldspar.

Potassium is one of the lightest of metals. With oxygen it makes potassa or potash.

Sodium with oxygen forms soda.

Calcium with oxygen makes lime.

Magnesium with oxygen forms magnesia, an abundant substance in the composition of many rocks.

The other elements are either well known or would require too much space for description.

Mineral and Rock Defined.

A mineral is an element or two or more elements chemically united as found in nature. Water is a mineral. A rock generally lacks definite chemical composition, and usually consists of two or more minerals physically united or mixed, and found in nature. If a man makes a hard substance by mixing sand and cement, it is not a rock or a mineral, because not found in nature.

Scientists usually distinguish minerals from rocks in their names. The names of minerals usually end in *ite*, the names of rocks in *yte*. Halite is the mineral common salt. Trachyte is a common rock in mining regions. Dioryte, Phonolyte, Doleryte, are rocks. The rock well known as Granite will probably maintain its old spelling. There are about 700 well known minerals; of these 200 are *ides*, 200 are silicates, and 300 are other *ates*—sulphates, etc.

Kinds of Rocks.

Dana divides the kinds of rocks into three classes:

1. Fragmental Rocks—except limestones.
2. Limestones or Calcareous Rocks.
3. Crystalline Rocks—except limestones.

The First or Fragmental Class

Embraces 1. *Conglomerate*, made up of pebbles and boulders. 2. *Grit*, coarse sand stone. 3. *Sandstone*. 4. *Sand-Rock*, made of sand not siliceous. 5. *Shale*, uneven flaty rock of varied colors. 6. *Argillyte*, flagstone. 7. *Tufa*, volcanic sand-rock. 8. *Sand and Gravel*. 9. *Green Sand*. 10. *Clay*. 11. *Alluvium Silt and Till*. 12. *Tripolyte*, infusorial earth.

The Second or Limestone Class

Is divided into two sections, 1. Not Crystalline, and 2. Crystalline.

1. *Massive Limestone.* 2. *Magnesian Limestone or Dolomyte.* 3. *Chalk.* 4. *Marl.* 5. *Travertine*, and 6. *Stalagmites*, are included in the first section.

The Crystalline Limestone embraces 1. *Marble.* 2. *Dolomyte.*

The Third or Crystalline Class

Embraces the siliceous rocks, and all the crystalline rocks except marbles. It is divided into nine groups.

1st Group—Siliceous Rocks.

1. *Quartzyte*, siliceous sandstone. 2. *Itacolumyte*, schistose, mica and quartz grains. 3. *Siliceous Slate.* 4. *Chert*, an impure flint. 5. *Jasper Rock*, flinty red or yellow rock. 6. *Buhrstone*, cellular flinty rock. 7. *Fioryte*, opal or pearl silica.

2d Group—Mica and Potash Feldspar Series.

1. *Granite.* 2. *Granulyte*, contains no mica. 3. *Gneiss*, in layers. 4. *Protogene.* 5. *Mica Schist*, largely of mica. 6. *Hydromica Schist.* 7. *Paragonite Schist*, contains soda. 8. *Minette.* 9. *Greisen.* 10. *Mica-Argillyte*, variety of flagging stone. 11. *Felsyte*, compact orthoclase. 12. *Porcelanyte*, baked clay.. 13. *Trachyte*-mainly of feldspar. 14. *Pearlstone*, including *Obsidian* and *Pumice.* 15. *Leucityte.*

3d Group—Mica and Soda, Lime, Feldspar Series.

1. *Kersantyte.* 2. *Kinzigyte.* 3. *Miascyte.* 4. *Ditroyte.* 5. *Phonolyte*, clinkstone.

4th Group—Hornblende and Potash Feldspar Series.

1. *Syenyte*, of which the pyramids are made. 2. *Syenyte Gneiss*, like gneiss, with mica replaced by hornblende. 3. *Hornblende Schist.* 4. *Amphibolyte.* 5. *Actinolyte.* 6. *Unakyte.* 7. *Zircon-Syenyte.* 8. *Foyayte.*

5th Group—Hornblende and Soda, Lime, Feldspar Series.

1. *Dioryte*, greenstone. 2. *Andesyte.* 3. *Labradioryte.* 4. *Corsyte.* 5. *Isenite.* 6. *Euphotide.*

6th Group—Pyroxene and Soda, Lime, Feldspar Series.

1. *Augite-Andesyte.* 2. *Noryte*, gabbro. 3. *Hypersthenyte.* 4. *Doleryte*, basalt, trap. 5. *Eucryte.* 6. *Amphigenyte.* 7. *Nephelinyte.* 8. *Tachylyte.*

7th Group—Pyroxene, Garnet, Epidote and Chrysolite Rocks, with little or no Feldspar.

1. *Pyroxenyte.* 2. *Garnetyte.* 3. *Eclogyte.* 4. *Epidosyte.* 5. *Eulysyte.* 6. *Chrysolyte.* 7. *Lherzolyte.* 8. *Picryte.* 9. *Limburgyte.*

8th Group—Hydrous Magnesian and Aluminous Rocks.

1. *Chlorite-Schist.* 2. *Chlorite-Argillyte.* 3. *Talcose-Schist.* 4. *Steatyte*, soapstone. 5. *Serpentine*, greasy green rock. 6. *Ophiolyte*, verd-antique marble. 7. *Pyrophyllyte*, slate of a soapy feeling.

9th Group—Iron Ore Rocks.

1. *Hematyte*, specular iron ore. 2. *Itabyryte*, mica schist with hematyte leaves. 3. *Magnetyte*, magnetic iron ore. 4. *Menaccanyte*, titanic iron ore. 5. *Franklinyte*, with zinc and manganese.

Aids in Studying Minerals.

The physical properties of minerals will aid in their determination. Lustre, color, transparency, malleability, sectility, brittleness, elasticity, taste and odor, will receive attention.

Hardness.

The scale of hardness is Talc, 1; Rock-salt, 2; Calc. Spar, 3; Fluor Spar, 4; Apatite, 5; Feldspar, 6; Quartz, 7; Topaz, 8; Sapphire, 9; Diamond, 10. To illustrate, a mineral that will scratch apatite and is scratched by feldspar, is said to have a hardness between 5 and 6. A simpler scale is suggested, thumb-nail, knife and quartz crystal. The thumb-nail will scratch 1, 2 and 3. A knife will cut from 1 to 6. In fact, many miners trust entirely to their knives to settle the question of hardness. Minerals that will scratch quartz crystals are rare.

Specific Gravity.

This refers to comparison of weight. Pure water is taken as the standard. The mineral is attached by a slender thread beneath one side of a balance, or under a spring scale, and its weight found. Next let the mineral hang in a glass of water, and as it thus hangs, find again its weight. It will be less than before. Subtract the weight in water from the weight in the air, and divide this difference into the weight in air. For example, suppose a piece of iron in air weighs 460 grains, in water 401.16 grains. 460—401.16=58.84, difference. 460 divided by 58.84 equals 7.8, the specific gravity of iron.

Blowpipe.

To use this valuable instrument, practice is necessary, to secure a continuous stream of air from the mouth. Pieces of charcoal, small spirit lamp, bottle of alcohol, and some borax and soda, with some copper and iron wire, make an outfit. If the prospector cannot carry all these things, he may often secure satisfactory results by using with the blowpipe a piece of burning wood from his cooking-fire.

In using the blowpipe it is important to remember that a trial of fusibility with the forceps, if not at once producing fusion, should be made on a piece of the mineral not larger than the fourth of an ordinary pin-head, and it should be either oblong and slender, or thin, and be made to project considerably beyond the points of the forceps, lest the forceps carry off the heat, and cause a failure where there ought to be success. Further, it should be borne in mind, that in using charcoal, a white coating is always a consequence of burning it, since the ash from its own combustion is white.

Crystallography.

Minerals are mostly crystallized, and a knowledge of crystals is an important aid to a prospector. The subject is too complex and extensive for the scope of this work.

Simple Tests.

An outfit for making the simple tests suggested below, may consist of three small bottles with glass stoppers, one of nitric acid, one of hydrochloric acid, and one of sulphuric acid, half a dozen test-tubes, and some glass tubing, pair of forceps, or piece of tin with a hole in it, in addition to the blowpipe outfit described above.

Carbonates.—Nitric or hydrochloric acid poured on powdered minerals containing carbonic acid, will cause a brisk boiling or effervescence.

Gelatizing Silica.—Some silicates when powdered and treated with hydrochloric acid, deposit the silica as jelly. Burning before treatment is advised in some cases.

Decomposing by Acids.—Some minerals after being finely powdered and boiled

with strong acid, will deposit silica or sulphur or other substances on the glass above, or as a sediment at the bottom.

Odor of Fumes.—Before the blowpipe sulphur, arsenic, selenium and phosphorus compounds give off their peculiar odors. Antimony fumes are dense, white, and without odor.

Fusibility.—The scale of fusibility is from one to five. A mineral that will melt in a candle flame is 1; that cannot be fused, 5.

Color of Flame.—When a mineral contains sodium, it will burn with a deep yellow flame. When soda is absent, *potash* will give a pale violet flame, *lime* a pale reddish-yellow, *lithium* deep purple-red, *strontium* a bright red, *copper* emerald-green, *phosphates* bluish-green, *boron* yellowish green, *copper chloride* azure-blue.

Zinc.—This metal when heated covers the charcoal with zinc oxide, which is yellow while hot, and white on cooling.

Lead.—When the mineral is treated with soda on charcoal in the oxidizing flame, the yellow oxide coats the charcoal.

Copper.—The flame is mostly bright green. With borax, a red or green bead is formed.

Mercury.—Heated in a closed tube with soda, mercury is deposited, and covers the inside of the tube.

Silver.—Argentiferous galena is tested on bone ashes, and subjected to the oxidizing flame. The lead sinks into the bone and leaves a brilliant globule of silver.

Chlorides.—If a bead of borax be saturated with copper oxide, and then dipped into the powder of a substance which is to be tested for chlorine, a chloride of copper is formed, which imparts an azure-blue color to the flame if any chlorine is present.

Phosphates. These give a dirty-green color to the blowpipe flame. The color is more distinct if the substance is first moistened with sulphuric acid.

Carbonates of Silver and Lead.—To assay carbonate of silver and lead, take the mineral or quartz, pulverize it, put it in a crucible or a common clay pipe; put in as much common salt as mineral; let it come to a boil. When it cools the silver and lead, will be in the bottom, silver the lowest. To separate the lead from the silver, put it in a bone dust cup and melt; the lead will absorb into the cup, leaving the silver and gold. To separate the latter, boil it in nitric acid, and this will leave the gold.

Suggestions to Prospectors.*

Quartz occurs of nearly every color, and of various degrees of glassy lustre to a dull stone without the slightest glistening. The common grayish cobble-stones of the fields are usually quartz, and others are dull red and brown; from these there are gradual transitions to the pellucid quartz crystal that looks like the best of glass. Sandstones and freestones are often wholly quartz, and the seashore sands are mostly of the same material.

Let the first trial of specimens obtained be made with a file, or the point of a knife, or some other means of trying the hardness; if the file makes no impression, there is reason to suspect the mineral is quartz; and if on breaking it, no regular structure or cleavage plane is observed, but it breaks in all directions with a similar surface and a more or less vitreous lustre, the probability is much strengthened that this conclusion is correct. The blowpipe may next be used; and if there is no fusion produced by it in a careful trial, there can be little doubt that the specimen is in fact quartz.

Calcite (calcium carbonate), including limestone, is another very common species. If the mineral is rather easily impressible with a file, it may be of this species; if it

* Dana's Manual.

effervesces freely when placed in a test-tube containing dilute hydrochloric acid, and is finally dissolved, the probability of its being carbonate of lime is increased. If the blowpipe produces no trace of fusion, but a brilliant light from the fragment before it, but little doubt remains on this point. Crystalline fragments of calcite break with three equal oblique cleavages.

These abbreviations are used in the following analysis, with reference to color: *bnh.*, brownish; *bkh.*, blackish; *gnh.*, greenish; *gyh.*, grayish; *rdh.*, reddish. The acids: *nit.*, nitric acid; *sulph. acid*, sulphuric acid; *HCl.*, hydrochloric acid; *sulph.*, sulphurous or sulphurous acid. *Coal* is used for charcoal; *fus.*, for fusible; *infus.*, for infusible; *sol.*, for soluble; *st.*, for streak. B. B. means the action produced in the blowpipe flame. O. F. is the outer or oxidizing flame. R. F. is the inner or reducing flame. H. means hardness. 1–2 means from 1 to 2. G. means specific gravity. Hydrous, containing water. For meaning of words not understood consult a dictionary.

SYNOPSIS OF THE ARRANGEMENT.*

I. ELEMENTS.

1. Lustre metallic; liquid.
2. Lustre metallic; malleable and eminently sectile.
3. Lustre metallic; brittle; B. B. on coal, wholly volatile, with no sulphurous fumes.
4. Lustre metallic; brittle; H=1–2; leaves a trace on paper; B. B. on coal, infusible, no fumes or odor.
5. Unmetallic; burns readily with a blue flame.
5. Lustre adamantine; H=10.

II. MINERALS NOT ELEMENTS, THAT B. B. ON COAL ARE WHOLLY VOLATILE.

1. Lustre metallic; streak metallic.
2. Lustre unmetallic; streak same as color.

III. COMPOUNDS OF GOLD, SILVER, COPPER, LEAD, TIN, MERCURY, CHROMIUM, COBALT, MANGANESE: *yielding, on heating, a malleable, or liquid (for mercury ores), metallic globule, affording a decisive blowpipe reaction, proving the presence of one or more of these metals.*

A. Yielding a malleable globule B. B. on coal with, if not without, soda.

1. Compounds of Gold.
2. Compounds of Silver.
3. Compounds of Copper.
4. Compounds of Lead.
5. Compounds of Tin.

B. Yielding drops of mercury with soda in a closed tube.

1. Compounds of mercury.

C. A decisive reaction with borax or salt of phosphorus for chromium, cobalt, or manganese.

1. Compounds of Chromium.
2. Compounds of Cobalt.
3. Compounds of Manganese.

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*To use this analysis, carefully inspect your mineral and find under which class it comes; then by the tests given, you can determine very closely the name of the substance in hand.

This arrangement is taken from Dana's Manual of Mineralogy and Lithology, published by John Wiley & Son, New York City, a work that should be owned by all mineralogists.

IV. MINERALS OF METALLIC OR SUBMETALLIC LUSTRE, NOT INCLUDED IN PRECEDING DIVISIONS.

1. Yielding fumes in the open tube or on coal, but not wholly vaporizable.
   - A. Streak metallic.
   - B. Streak unmetallic.
     - *a.* Fumes sulphurous only.
     - *b.* Fumes arsenical, with or without sulphurous.
2. Not yielding fumes of any kind; streak unmetallic.
   - A. B. B. easily fusible, giving a magnetic bead; lustre submetallic.
   - B. Infusible, or nearly so.
     - *a.* Reaction for iron; anhydrous.
     - *b.* Reaction for iron; hydrous.
     - *c.* Reaction for chromium or titanium.
     - *d.* Reaction for osmium with nitre.

V. MINERALS OF UNMETALLIC LUSTRE.

1. Having an acid, alkaline, alum-like, or styptic taste.
   - A. **Carbonates**: Taste alkaline; effervescence with HCl.
   - B. **Sulphates**: No effervescence; reaction for sulphur with soda.
   - C. **Nitrates**: With sulph. acid, reddish acrid fumes; no action with HCl; deflagrate.
   - D. **Chlorides**: With sulph. acid, acrid fumes of HCl; no fumes with HCl.
   - E. **Borates**: No effervescence; reaction for boron when moistened with sulph. acid.
2. Not having either of the above-mentioned kinds of taste.
   - A. **Carbonates**: Effervescing with HCl.
     - *a.* Infusible; assay alkaline after ignition.
     - *b.* Infusible; become magnetic and not alkaline, on ignition.
     - *c.* Infusible; B. B. on coal with soda, zinc oxide vapors.
     - *d.* Infusible; B. B. on coal reaction for nickel.
     - *e.* Fusible; assay alkaline after ignitio·
   - B. **Sulphates**: Reaction for sulphur with sc
     - *a.* Fusible; assay alkaline after fusion
     - *b.* Fusible; reaction for iron.
     - *c.* Infusible.
   - C. **Arsenates**: on coal arsenical fumes.
   - D. **Silicates, Phosphates, Oxides**:

Species not included in the preceding subdivisions.

I. Streak Deep Red, Yellow, Brownish-Yellow, Green, or Black.

- A. Infusible, or fusible with difficulty.
- B. Fusible without much difficulty.

II. Streak Grayish or not Colored.

1. INFUSIBLE.

- A. Gelatinize with acid, forming a stiff jelly.
- B. Not forming a stiff jelly; hydrous.
  - *a.* Blue color with cobalt solution.
  - *b.* Reddish or pink color with cobalt solution.
  - *c.* Not blue or red with cobalt solution.
- C. Not forming a stiff jelly; anhydrous.
  - *a.* Blue color with cobalt solution.
  - *b.* Not blue or reddish color with cobalt solution.

2. FUSIBLE WITH MORE OR LESS DIFFICULTY.

- A. Gelatinize and form a stiff jelly.
  - *a.* Hydrous; fuse easily.

b. Hydrous; fuse with much difficulty.
c. Anhydrous.
α. No reaction for sulphur; no coating on coal.
β. Reaction for sulphur with soda.

B. Not gelatinizing.
1. Structure eminently micaceous; folia tough, pearly, and H. of surface of folia not over 3.5; anhydrous or hydrous.
2. Structure not eminently micaceous.
a. Hydrous.
α. No reaction for phosphorus or boron.
†. H=1–3; lustre not at all vitreous.
††. H=3.5–6.5; lustre of cleavage surface sometimes pearly; elsewhere vitreous.
β. Reaction for phosphorus or boron.
b. Anhydrous.
α. B. B. lithium-red flame.
β. B. B. boron reaction (green flame).
γ. B. B. reaction for titanium.
δ. B. B. reaction for fluorine or phosphorus.
ε. B. B. reaction for iron.
ϑ. B. B. no reaction for iron: not of the preceding subdivisions.

I. ELEMENTS.

1. LUSTRE METALLIC; LIQUID.

Mercury. This is the only metallic mineral which is liquid at the ordinary temperature and atmospheric pressure.

2. LUSTRE METALLIC; MALLEABLE AND EMINENTLY SECTILE.

Gold. G.=15–19 5; yellow; fusible; not sol. in nitric acid or HCl, but sol. in aqua regia (mixture of the two acids named).
Platinum. G.=16–19; nearly white; infusible; insol. in nitric acid.
Palladium. G.=11.3–11 8; grayish-white; diff. fusible; sol. in nitric acid.
Silver. G.=10–11.1; white; fusible; sol. in nitric acid, and deposited again on copper.
Copper. G.=8.84; copper-red; fus.; sol. in nitric acid, and the solution becomes sky-blue when ammonia is added.
Iron. G.=7.3–7.8; iron-gray; attracted by the magnet.

The only other mineral of metallic lustre that is also malleable and eminently sectile is *argentite*, a silver sulphide, along with two others of like composition but different crystallization.

3. LUSTRE METALLIC; BRITTLE; B. B. WHOLLY VOLATILE, BUT GIVE OFF NO SULPHUROUS FUMES.

Bismuth. G.=9.73; reddish-white; on coal a yellow coating; fumes inod.
Antimony. G.=6 6–6.7; tin-white; fumes dense wh., inod.
Arsenic. G.=5.9–6; tin-white; fumes white, alliaceous.
Tellurium. G.=6.1–6.3; tin white; fus.; fumes white; flame green.

The only other mineral that is wholly volatile, and also gives off no sulphurous fumes, is allemontite, an antimony arsenide.

4. LUSTRE METALLIC; H.=1–2; B. B. ON COAL INFUSIBLE; NO FUMES.

Graphite.

5. LUSTRE UNMETALLIC; TAKES FIRE READILY IN THE FLAME OF A CANDLE, AND BURNS WITH A BLUE FLAME.

Sulphur.

6. LUSTRE ADAMANTINE; H=10.

Diamond. Easily scratches corundum or sapphire.

II. MINERALS, NOT ELEMENTS, THAT ARE WHOLLY VOLATILE B. B. ON COAL.

1. LUSTRE METALLIC; STREAK METALLIC.

Tetradymite. G.=7.2–7.9; pale steel-gray; so soft as to soil paper; on coal white fumes; flame bluish-green; sometimes sulph. odor; in open tube, a coating which fuses to white drops.

Bismuthinite. G.=6.4–7.2; whitish lead-gray; on coal yellow coating and sulph. odor.

Stibnite. G.=4.5–4.52; lead-gray; on coal dense wh. fumes and wh. coating.

2. LUSTRE UNMETALLIC; STREAK SAME NEARLY AS COLOR.

Orpiment. Lemon yellow; on coal burns, odor alliaceous.

Realgar. Bright red; on coal burns, odor alliaceous.

Arsenolite. White; on coal, odor alliaceous.

Valentinite. White; on coal dense wh. fumes, inod.

Cinnabar. Red; in open tube, sulph odor, coating of mercury globules.

Salmiak. White; saline and pungent taste; on coal, fumes of ammonia.

III. COMPOUNDS OF GOLD, SILVER, MERCURY, COPPER, LEAD, TIN, CHROMIUM, COBALT, MANGANESE.

A. YIELDING A MALLEABLE GLOBULE B. B. ON COAL, WITH OR WITHOUT SODA.

1. Compounds of Gold.

Yielding gold, or an alloy of gold and silver, B. B. on coal. The *tellurium ores* give a coating of drops of tellurous acid in open tube.

2. Compounds of Silver.

B. B. easily fusible; G. above 5; yield, with few exceptions, a globule of silver (white and malleable), on coal, with soda, if not without; and, in the exceptions, silver globule obtained by cupellation. All have metallic lustre excepting cerargyrite, bromyrite, and iodyrite.

a. Eminently Sectile.

Argentite. G.=7.2–7.4; lustre metallic; on coal sulph. fumes.

Cerargyrite. G.=5.3–5.6; lustre like that of white, gray, or greenish to brownish wax.

b. Not Sectile; on Coal Odorous Fumes.

Sulphides. Give sulph. odor.

Arsenical Ores. Alliaceous fumes.

Selenides. Horse-radish odor.

c. Not Sectile; on Coal Fumes of Antimony or Tellurium.

Antimonial Ores. Dense white fumes of antimony; with also, if sulphur is present, sulph. fumes.

Tellurides. In open tube coating which fuses to drops of tellurous acid.

Stromeyerite. Contains copper, and requires cupellation in order to obtain a globule of silver.

3. Compounds of Copper.

Unless iron is present, a globule of metallic copper is obtained with soda, if not without, on coal; with a nitric acid solution and ammonia in excess a bright blue color; moistened with HCl the blue flame of chloride of copper; and a clean surface of iron in the nitric solution becomes coated with copper.

1. METALLIC LUSTRE.

Sulphides. On coal or in open tube, sulph. fumes.

Arsenides, Selenides.

Antimonial Sulphides.

2. LUSTRE UNMETALLIC; B. B. NEITHER ON COAL NOR IN OPEN TUBE ANY ODOROUS FUMES; NO TASTE.

Cuprite. H.=3.5–4; G.=5.8–6.2; isometric; deep red, streak bnh-red.

Atacamite. Darkish bright green, streak gnh; B. B. on coal fuses, coloring O. F. azure-blue, with a green edge; easily sol. in acids.

Phosphates.

Malachite. H.=3–4; G.=3.7–4; light to deep green; effervesces with HCl.

Azurite. H.=3.5–4.5; G.=3.5–3.9; deep blue; effervesces with HCl.

Dioptase. H.=5; G.=3.25–3.35; emerald green; B. B. infusible.

Chrysocolla. Bluish-green; B. B. infusible.

3. LUSTRE UNMETALLIC; B. B. ON COAL, OR IN CLOSED TUBE, ODOROUS FUMES OF ARSENIC OR SULPHUR, OR REACTION FOR SULPHUR.

Arsenates. On coal arsenical fumes.

Chalcanthite. Blue; taste nauseous; astringent.

Also *Stromeyerite*, *Stannite*, *Bournonite* give reactions for copper.

4. Compounds of Lead.

Yield B. B. on coal a dark lemon-yellow coating finally, with soda, if not without, a globule (metallic and malleable) of lead is obtained; but by continued blowing with O. F. the lead all goes off in fumes, leaving other more stable metals (silver, etc.) behind. Sulphurous, selenious and tellurous fumes easily obtained either on coal or in an open tube from the sulphide, selenide, tellurides; and arsenical or antimonial fumes from ores containing arsenic or antimony. None have taste.

1. LUSTRE METALLIC.

Galenite. H.=2.5; G.=7.2–7.7; cleavage cubic eminent; lead-gray, streak same; in open tube sulph.

Selenides, Tellurides, Antimonial and Arsenical Sulphides.

2. LUSTRE UNMETALLIC; NO ODOROUS FUMES, OR REACTION FOR SULPHUR.

Minium. Bright red, streak same.

Crocoite. Monoclinic; bright red, streak orange-yellow; B. B. with salt of phosphorus emerald-green bead.

Pyromorphite. Hexagonal; bright green to brown, rarely orange-yellow; streak white. B. B. fuses easily, coloring flame bluish-green.

Cerussite. Trimetric, often in twins; H.=3–3.5; G.=6.4–6.8; white, gyh; lustre adamantine; often tarnished to grayish metallic adamantine. Effervesces in dilute nitric acid.

3. UNMETALLIC; REACTION FOR SULPHUR.

Anglesite. Trimetric; white, gyh; fuses in flame of candle; B. B. reaction for sulphur; no effervescence with acids.

5. Compounds of Tin.

Cassiterite. H.=6–7; G.=6.4–7.1; brown, gyh, ywh, black; B. B. infusible; on coal with soda a globule of tin, yield no fumes.

Stannite. A copper, iron, and tin sulphide, does not give B. B. a metallic malleable globule.

B. Yielding Drops of Mercury in Closed Tube With or Without Soda.

Compounds of Mercury.

Cinnabar. H.=2–2.5; G.=8–9; bright red, bnh red, gyh; streak scarlet.

Amalgam. H.=3–3.5; G.=13–14; silver-white; yields silver B. B. on coal.

Spaniolite. A variety of tetrahedrite, yields mercury.

C. No Malleable Globule; Decisive Reaction With Borax or Salt of Phosphorus for Chromium, Cobalt, or Manganese.

1. Compounds of Chromium.

Give with borax an emerald-green bead in both flames.

Chromite. H.=5.5; G.=4.3–4.5; isometric, often in octahedrons, massive; submetallic; bnh iron-black, streak brown; B. B. on coal becomes magnetic; with borax, a bead which is emerald-green on cooling.

Crocoite. H.=2.5–3; G.=5.9–6.1; bright red, streak orange; B. B. fuses very easily, on coal globule of lead, and with salt of phosphorus emerald-green bead. *Phœnicochroite* and *Vauquelinite* are other lead chromates.

2. Compounds of Cobalt.

Give a blue color with borax after, if not before, roasting.

[When much nickel or iron is present the blue color is not obtained; and species or varieties of this kind are not here included.]

1. LUSTRE METALLIC.

Cobaltite. H.=5.5; G.=6–6.3; isometric and pyritohedral; rdh silver-white, streak grayish-black; B. B. on coal sulph. and arsen. fumes, and a magnetic globule.

Smaltite. H.=5.5–6; G.=6.4–7.2; tin-white, streak gyh black; B. B. on coal alliaceous fumes; most varieties fail to give the blue color immediately with borax, because of the iron and nickel present.

Linnæite. H.=5.5; G.=4.8–5; isometric; pale steel-gray, copper-red tarnish, streak bkh gray. B. B. on coal sulph. fumes.

2. LUSTRE UNMETALLIC.

Erythrite. H.=1.5–2.5; G.=2.95; monoclinic, one highly perfect cleavage, also earthy; rose-red, peach-blossom red, streak reddish; B. B. fuses easily; yields water.

Bieberite. A cobalt sulphate.

Remingtonite. A hydrous cobalt carbonate.

3. Compounds of Manganese.

Give an amethystine globule in O. F. with borax. [The globule looks black if too much of the manganese mineral is used, and with a large excess may be opaque.]

1. GIVES OFF CARBONIC ACID WHEN TREATED WITH DILUTE HCl; LUSTRE UNMETALLIC.

Rhodochrosite. H.=3.5–4.5; G.=3.4–3.7; rose-red.

Also manganese-bearing varieties of calcite, dolomite, ankerite, siderite, all of which have the cleavage and general form of rhodochrosite; when containing a few per cent. of manganese they often turn black on exposure.

2. TREATED WITH HCl YIELDS CHLORINE FUMES.

Manganite. H.=4; G.=4.2–4.4; in oblong trimetric prisms; grayish-black, streak reddish-brown; lustre submetallic; B. B. infusible; yields water.

Psilomelane. H.=5–7; G.=3.7–4.7; amorphous; black, streak brownish-black; submetallic; B. B. infusible; yields water.

Wad is similar, but often contains cobalt.

Pyrolusite. H.=2–2.5; G.=4.82; in stoutish trimetric crystals; metallic; dark steel gray, streak black or bluish-black; B. B. infusible; yields no water.

Braunite and **Hausmannite** are other anhydrous manganese oxides.

Franklinite. H.=5.5–6.5; G.=5–5.1; in octahedrons and massive; iron-black, streak dark reddish-brown; B. B. infusible; but little chlorine with HCl.

3. CARBONIC ACID OR CHLORINE NOT GIVEN OFF WHEN TREATED WITH HCl; ANHYDROUS.

Rhodonite. H.=5.5–6.5; G.=3.4–3.68; rose-red; B. B. fuses easily.

Triplite. H.=5.5; G.=3.4–3.8; brown to black; B. B. fuses very easily, globule magnetic; sol. in HCl.

Helvite. H.=6–6.5; G.=3.1–3.3; in yellowish tetrahedrons; B. B. fuses easily.

Spessartite (Manganesian Garnet). H.=6.5–7; G.=3.7–4.4; in dodecahedrons and trapezohedrons; red, brownish-red; B. B. fuses easily.

Tephroite. H.=5.5–6; G.=4–4.12; reddish to brown and gray; B. B. fuses not very easily; gelat. in HCl.

Knebelite is related, and also gelatinizes.

Hausmannite. H.=4; G.=3.46; isometric, reddish-brown, streak brownish red. B. B. yields sulphur, after roasting reaction for manganese.

Alabandite. H.=3.5–4; G.=4; submetallic, iron-black; streak green; B. B. on coal sulphur, after roasting reaction for manganese.

Vesuvianite, epidote, axinite, ilvaite, göthite, include varieties that give reaction for manganese.

IV. MINERALS OF METALLIC OR SUBMETALLIC LUSTRE, NOT INCLUDED IN PRECEDING DIVISIONS.

1. Yielding Fumes in Open Tube or on Coal, but not wholly Vaporizable.

A. *Streak metallic.*

Molybdenite. H.=1–1.5; G.=4.4–4.8; lead-gray, and leaves trace on paper; B. B. on coal sulphurous fumes.

Bismuthinite. H.=2; G.=6.4–7.2; lead-gray, whitish; B. B. on coal sulphurous fumes, and yellow bismuth oxide; sol. in hot nitric acid and a white precip. on diluting with water.

B. *Streak unmetallic.*

a. Fumes sulphurous only.

Pyrite. H.=6–6.5; G.=4.8–5.2; isometric and pyritohedral; pale brass-yellow, streak gnh black, bnh black; B. B. on coal, fuses to a magnetic globule.

Marcasite. H.=6–6.5; G.=4.68–4.85; *trimetric;* pale bronze-yellow; streak gyh black, bnh black; B. B. like pyrite.

Pyrrhotite. H.=3.5–4.5; G.=4.4–4.68; hexagonal; bronze-yellow, rdh; streak gyh black; slightly magnetic; B. B. fuses to a magnetic mass.

Millerite. H.=3–3.5; G.=4.6–5.7; rhombohedral, usually in acicular or capillary forms, also in fibrous crusts; brass-yellow, somewhat bronze-like; B. B. fuses to a globule, reacts for nickel.

Linnæite. H.=5.5; G.=4.8–5; isometric; pale steel-gray, copper-red tarnish; streak blackish-gray; B. B. on coal fuses to a magnetic globule, after roasting gives reactions for nickel, cobalt, and iron.

Sphalerite. H.=3.5–4; G.=3.9–4.2; isometric; lustre submetallic; streak nearly uncolored; nearly infusible alone and with borax; on coal a coating of zinc oxide.

b. Arsenical fumes, with or without sulphurous.

Arsenopyrite. H.=5–6; G.=6–6.4; trimetric; white, gyh, streak dark gyh black. In closed tube, red arsenic sulphide and metallic arsenic; B. B. on coal fuses to magnetic globule.

Gersdorffite. H.=5.5; G.=5.6–6.9; isometric, pyritohedral; white, gyh, streak grayish-black. In closed tube arsenic sulphide, on coal not magnetic, and reacts for nickel and often cobalt.

Niccolite. H.=5–5.5; G.=7.3–7.7; hexagonal; pale copper-red, streak pale bnh black; in open tube, coating of arsenious acid; B. B. on coal no sulph. fumes, fuses to globule which reacts for iron, cobalt and nickel.

Smaltite. H.=5.5–6; G.=6.4–7.2; isometric; tin-white; streak gyh black; on coal, no fumes of sulphur or only in traces.

2. Not Yielding Fumes of Any Kind. Streak Unmetallic.

A. *B. B. easily fusible, and giving a magnetic bead. Lustre submetallic.*

Ilvaite. H.=5.5–6; G.=3.7–4.2; trimetric; gyh iron-black, streak gnh or bnh black; gelat. with HCl.

Allanite. H.=5.5–6; G.=3–4.2; monoclinic; bnh pitch-black, streak gyh, bnh; B. B fuses easily; most varieties gelat. with HCl.

Wolframite. H.=5–5.5; G.=7.1–7.6; monoclinic; gyh black or bnh black; B. B. fuses easily, and reacts for iron, manganese, and tungsten.

B. *Infusible or nearly so.*

a. Reaction for iron; anhydrous; H.=5–6.5.

Magnetite. G.=4.9–5.2; isometric; iron-black; streak black; strongly magnetic.

Menaccanite. G.=4.5–5; rhombohedral; iron-black; streak submetallic, black to bnh red; very slightly magnetic.

Hematite. G.=4.5–5.3; rhombohedral; gyh iron-black; in very thin splinters or scales blood-red by transmitted light; streak red; sometimes slightly magnetic.

Martite. Same as hematite, but isometric.
Tantalite. G.=7–8; trimetric; iron-black, streak rdh brown to black.
Franklinite. H.=5.5–6.5; G.=4.8–5.1; octahedral, massive; iron-black; streak dark rdh brown; slightly attracted by magnet; with soda reaction for manganese.
Columbite. G.=5 4–6 5; trimetric; iron-black, gyh black, streak dark red to black, often with a bluish steel-tarnish.
Samarskite. H.=5.5–7; G.=5.6–5.8; velvet-black, pitch-black; streak dark rdh brown; B. B. glows; fuses with difficulty.

b. Reaction for iron; hydrous; lustre submetallic.

Limonite. G.=3.6–4; massive, often stalactitic and tuberose with surface sometimes highly lustrous, often subfibrous in structure; black, bnh black; streak bnh yellow.
Gothite. G.=4.0–4.4; trimetric; also fibrous and massive; bkh brown; streak bnh yellow.
Turgite. G.=3.6–4.68; fibrous and massive, looking like limonite; black, rdh black, streak red; in closed tube decrepitates, which is not the case with göthite and limonite.

c. Reaction for chromium or titanium.

Chromite. H.=5–5.5; G.=4 3–4.6; isometric; submetallic; bnh iron-black, streak brown; B. B. with borax gives a bead which on cooling is chrome-green.
Rutile. H.=6–6.5; G.=4.18–4.25; black, streak bnh; reacts for titanium. Black varieties of *brookite*, submetallic in lustre, give same reaction.
Euxenite, *yttrotantalite*, *æschynite*, *fergusonite*, and *perofskite* are submetallic in lustre.

d. Heated with nitre in a matrass yields fumes of osmium.

Iridosmine. H.=6–7; G.=19–21.2; in small scales from auriferous or platiniferous sands; tin-white, gyh.

V. LUSTRE UNMETALLIC.

1. Minerals Having an Acid, Alkaline, Alum-like, or Styptic Taste.

A. Carbonates: Taste alkaline; effervescing with HCl.

Natron. Effloresces on exposure.
Trona. Does not effloresce.

B. Sulphates: No effervescence; reaction B. B. on coal with soda for sulphur.

Mascagnite. Yields ammonia.
Mirabilite. Monoclinic, crystals stout; taste cool, saline, bitter; B. B. flame deep yellow.
Epsomite. Trimetric, crystals ordinarily slender, spicule-like; taste bitter and saline; B. B. flame not yellow.
Alunogen. Taste like common alum.
Kalinite, Mendozite, and other alums.
Melanterite. Green; taste styptic; reacts for iron.
Chalcanthite. Blue; reacts for copper.
Morenosite. Green; reacts for nickel.
Bieberite. Reddish; reacts for cobalt.
Goslarite. White; reacts for zinc.
Johannite. Emerald-green, reacts for uranium.

C. Nitrates: With sulphuric acid, reddish acrid fumes; no action with hydrochloric acid; deflagrate.

Nitre. Not efflorescent. Strong deflagration.
Soda-Nitre. Efflorescent.
Nitrocalcite. Deflagration slight.

D. Chlorides: With sulphuric acid acrid fumes of HCl; no fumes with HCl.

Salmiak. Taste saline, pungent; on coal, evaporates; with soda, odor of ammonia.
Sylvite. Taste saline; B B. flame purplish.
Halite or Common Salt. Taste saline; B. B. flame yellow.

E. **Borates**: No effervescence with acids; B. B. reaction for boron, when moistened with sulphuric acid.

Sassolite. Taste feebly acid; B. B. very fusible.
Borax. Taste sweetish alkaline; B. B. puffs up.

2. MINERALS NOT HAVING AN ACID, ALKALINE, ALUM-LIKE OR STYPTIC TASTE.

A. Carbonates: Effervescing with HCl.

a. Infusible; assay alkaline after ignition.

Calcite. H. under 3.5; G.=2.5–2.72; R ∧ R=105° 5′, with three easy cleavages paraliel to R; colors various; effervesces readily with cold HCl; anhydrous.
Aragonite. H.=3.5–4; G.=2.94; trimetric, cleavage imperfect; otherwise like calcite.
Dolomite. H.=3.5–4; G.=2.8–2.9; rhombohedral, R ∧ R=106° 15′; colors various; effervesces but slightly with *cold* HCl, unless finely pulverized; anhydrous.
Magnesite. H.=3.5–4.5; G.=3–3.1; rhombohedral, R ∧ R=107° 29′; white, ywh, gyh; effervesces but slightly with cold HCl; anhydrous.
Hydromagnesite. H.=1–3.5; G.=2.14–2.18; hydrous.

b. Infusible; become magnetic and not alkaline after ignition.

Siderite. H.=3.5–4.5; G.=3.7–3.9; rhombohedral, R : R=107°; cleavage as in calcite; becomes brown on exposure, changing to limonite.
Ankerite. H.=3.5–4; G.=2.9–3.1; R ∧ R=106° 7′; becomes brown on exposure.
Some kinds of *calcite* and *dolomite* contain iron enough to become magnetic on ignition.

c. Infusible; B. B. on coal with soda, coating of zinc oxide.

Smithsonite. H.=5; G.=4–4.5; rhombohedral like calcite; R ∧ R=107° 40′; crystals often an acute rhombohedron; anhydrous.
Hydrozincite. H.=2–2.5; G.=3.6–3.8; white, gyh, ywh, often earthy; reacts for zinc; hydrous.

d. Infusible; B. B. on coal reaction for nickel.

Zaratite (Emerald nickel). H.=3. Emerald-green, streak paler.

e. Fusible; assay alkaline after ignition.

Witherite. H.=3–3.75; G.=4 29–4.35; trimetric; white, ywh, gyh; B. B. fuses easily, flame ywh green; anhydrous.
Strontianite. H.=3 5–4; G.=3.6–3.72; trimetric; pale-green, gray, ywh, white; B. B. fuses only on thin edges, flame bright red; anhydrous.
Barytocalcite. Monoclinic. G.=3.6–3.66; B. B. nearly like witherite.

B. Sulphates or Sulphides: Reaction for sulphur with soda.

a. Fusible; assay alkaline after fusion.

Barite. H.=2.5–3.5; G.=4.3–4.72; trimetric; white, ywh, gyh, bluish, brown; B. B. decrepitates and fuses; flame yellowish-green; anhydrous.
Celestite. H.=3–3.5; G.=3 9–3.98; trimetric; white, pale blue, rdh; B. B. fuses, flame red; anhydrous.
Anhydrite. H =3–3.5; G.=2.9–3 0; trimetric, with three rectangular and easy cleavages differing but slightly; white, bluish, gyh, rdh, red; B. B. fuses, flame reddish yellow.
Gypsum. H.=1.5–2; G.=2 3–2.35; monoclinic, one perfect pearly cleavage; white, gray. but also brown, black from impurities; B. B. yields much water, becomes white and crumbles easily.

b. Fusible; reaction for iron.

Copiapite. H.=1.5; G.=2.14; yellow; on coal, becomes magnetic; hydrous.
Hauynite also gives the sulphur reaction with soda.

c. Infusible, or nearly so.

Aluminite. H.=1–2; G.=1.66; adheres to the tongue; white; B. B. blue with cobalt solution. **Alunite** is similar, but H.=4, and G.=2.58–2.75.

Sphalerite. H.=3.5–4; G.=3.9–4.2; isometric; light to dark resin-yellow; B. B. on coal, coating of zinc oxide.

C. Arsenates: Arsenical fumes on coal.

Scorodite. H.=3.5–4; G.=3.1–3.3; trimetric; leek-green to liver-brown; B. B. fuses easily, flame blue, and with soda gives a magnetic bead; on coal alliaceous fumes; in HCl. sol.

Pharmacosiderite. H.=2.5; G.=2.9–3; cubes and tetrahedrons; dark green, bnh. reddish; B. B. same as for scorodite.

Pharmacolite. H.=2–2.5; G.=2.6–2.75; wh, gyh, rdh; monoclinic with one eminent cleavage; B. B. fuses, flame blue; on coal, alliaceous fumes; after ignition assay alkaline; in HCl. sol.

D. Silicates, Phosphates, Oxides: Species not Included in the Three Preceding Subdivisions.

I. Streak Deep Red, Yellow, Brownish-Yellow, Green or Black.

a. Infusible, or fusible with much difficulty.

Hematite. Red to black; streak red; B. B. reaction for iron; magnetic after ignition in R. F.; anhydrous.

Limonite. Brownish and ochre-yellow to black; streak brownish yellow; B. B. gives off water, turns red, becomes magnetic in R. F.

Turgite. Brown to black; streak red; B. B. gives off water; decrepitates; becomes magnetic in R. F.

Fergusonite. Brownish black; infusible.

Zincite. Red; streak orange; B. B. on coal, zinc oxide coating, and coating moistened with cobalt solution, green in R. F.

b. Fusible without much difficulty.

Wolframite. Grayish to brownish black; streak dark reddish brown to black; lustre submetallic; G.=7.1–7.55. B. B. fuses easily, and becomes magnetic; reaction for tungsten.

Vivianite. Blue to green (to white); streak bluish-white; G.=2.5–2 7; H.=1.5–2, hydrous; B. B. fuses easily to magnetic globule, coloring flame bluish green.

Torbernite. Bright green, square tabular micaceous crystals; streak paler green; H.=2–2.5; hydrous; yields a globule of copper with soda.

Samarskite. H.=5.5–6; G.=5.6–5.8; velvet-black; streak dark reddish brown; B. B. fuses on the edges.

II. Streak Grayish or not Colored.

1. INFUSIBLE.

a. Gelatinize with acid, forming a stiff jelly.

Chrysolite. Yellow-green to olive-green, looking like glass; H.=6.7; G.=3.3–3.5; B. B. reacts for iron, becomes magnetic; anhydrous.

Chondrodite. H.=6–6.5; G.=3.1–3.25; pale yellow to brown, and reddish brown; lustre virtreous to resinous; B. B. reaction for iron and fluorine; anhydrous.

Allophane. H.=3; G.=1.8–1.9; always amorphous, never granular in texture; bluish, greenish; B. B. infus., a blue color with cobalt solution; hydrous.

Willemite, Calamine, Sepiolite, fuse with great difficulty, and are included under fusible gelatinizing species.

b. Not forming a stiff jelly with acid; hydrous.

a. Blue with cobalt solution (owing to presence of aluminum).

Wavellite. H.=3.25–4; G.=2.3–2.4; white to green, brown; B. B. bluish-green flame after moistening with sulph. acid.

Lazulite. H.=5.6; G.=3–3.1; blue; B. B. green flame, especially after moistening with sulph. acid; hydrous.

Turquois. H.=6; G.=2.6–2 85; sky-blue, pale green; B. B. flame green.

Kaolinite. H.=1–2; G.=2.4–2.65; white when pure; feels greasy; B. B. flame not green.

Gibbsite. H.=2.5–3.5; G.=2.3–2.4; white, grayish, greenish; B. B. flame not green; soluble in strong sulph. acid.

Diaspore. H.=6.5–7; G.=3.3–3.5; in thin foliated crystals, plates or scales; white, greenish, brownish; B. B. flame not green; soluble in sulphuric acid *after* ignition.

b. Pale red or pink color, with cobalt solution (owing to presence of magnesium).

Brucite. H.=2.5; G.=2.3–2.45; pearly, white, greenish; foliaceous or fibrous and flexible; B. B. after ignition, alkaline.

c. Not blue or red with cobalt solution.

Opal. H.=5.5–6.5; G.=1.9–2.3; B. B. with soda soluble with effervescence.

Genthite. H.=3–4; G.=2.4; pale green, yellowish; B. B. with borax a violet bead, becoming gray in R. F. owing to nickel; decomp. by HCl.

Chrysocolla. H.=2–4; G.=2–2.24; pale bluish-green to sky-blue; B. B. flame emerald-green, and with soda on coal globule of copper.

The micas, chlorites, chloritoid, and serpentine often fuse on their edges with *much* difficulty.

c. Not forming a stiff jelly; anhydrous; H.=5–9.

a. Blue color with cobalt solution.

Corundum. H.=9; G.=4; rhombohedral; blue, white, red, gray, brown.

Chrysoberyl. H.=8.5; G.=3.7; gray, green, to emerald-green.

Topaz. H.=8; G.=3.5; in rhombic prisms with perfect basal cleavage, rarely columnar; white, wine-yellow, and other shades.

Rubellite. H.=7.5; G.=3; in prisms of 3, 6, or 9 sides; rose-red; reaction for boron.

Andalusite. H.=7.5; G.=3.2; always in prismatic crystals, often tesselated within, $I \wedge I = 93^\circ$; grayish-white to brown.

Fibrolite. H.=6–7; G.=3.2; columnar or fibrous forms and prismatic crystals with brilliant diag cleavage.

Cyanite. H.=5–7 (greatest on extremities of crystals); G.=3.5; in long or short prismatic crystallizations, often bladed prisms; pale blue to white and gray.

Leucite. H.=5.5–6; G.=2.5; white, gyh; often in trapezohedral crystals.

b. Not giving a blue or reddish color with cobalt solution; H.=5–8.

Spinel. H.=8; G.=3.5–4.1; in octahedrons of red, greenish gray, black colors. *Gahnite* is similar, but with borax on coal, gives reaction for zinc.

Beryl. H.=7.5–8; G.=2.6–2.7; always in hexagonal prisms; pale bluish and yellowish green, to emerald-green, also resin yellow and white, no distinct cleavage.

Zircon. H.=7.5; G.=4–4.75; dimetric, and often in square prisms; lustre adamantine; brown, gray.

Staurolite. H.=7; G.=3.4–3.8; in prisms of 123°, and often in cruciform twins; no distinct cleavage; brown, black, gray.

Quartz. H.=7; G.=2.6; often in hexagonal crystals with pyramidal terminations; of various shades of color. *Opal* is in part anhydrous.

Monazite. H.=5–5.5; G.=4.9–5.3; in small brown imbedded monoclinic crystals with perfect basal cleavage; B. B. flame bluish-green when moistened with sulph. acid.

Rutile. H.=6–6.5; G.=4.15–4.25; dimetric; reddish-brown to brownish-red, green, black; B. B. reaction for titanium. *Brookite* and *Octahedrite*, are similar, except in crystalline forms, and G. in brookite 4.0–4.25, in octahedrite 3.8–3.95.

Perofskite. H.=5.5; G.=4–4.1; yellowish, brown, black; cubic and octahedral forms; B. B. reaction for titanic acid.

Enstatite. H.=5.5; G.=3.1–3.3; in prismatic and fibrous forms with $I \wedge I = 88^\circ 16'$, also foliated, whitish, grayish, brown. *Anthophyllite* is similar, but $I \wedge I = 125^\circ$, and it fuses on the edges with great difficulty.

Iolite, *apatite*, *scheelite*, *euclase*, fuse with much difficulty, and euclase gives some water in closed tube when highly ignited.

2. FUSIBLE WITH LITTLE OR MUCH DIFFICULTY.

A. Gelatinize and afford a stiff jelly.

a. Hydrous; fuse easily.

Datolite. H.=5–5.5; G.=2.8–3; white, greenish, yellowish; crystals glassy, stout, sometimes massive and porcellanous, never fibrous; B. B. fuses easily, reaction for boron.

Natrolite. H.=5–5.5; G.=2.3–2.4; in slender rhombic prisms, and divergent columnar; white, ywh, rdh, red; B. B. fuses very easily.

Scolecite. H.=5–5.5; G.=2.16–2.4; cryst. much like natrolite, but twinned, with converging striæ; B. B. sometimes curls up, fuses very easily.

Gmelinite. H.=4.5; G.=2–2.2; in small and short hexagonal or rhombohedral cryst.; B. B. fuses easily.

Phillipsite. H.=4–4.5; G.=2.2; in twinned crystals; B. B. fuses rather easily.

Laumontite. H.=3.5–4; G.=2.2–2.4; white, reddish; crystals become white and crumbling on exposure to the air; B. B. fuses rather easily.

Pectolite and *Analcite*, imperfectly gelatinize.

b. Hydrous; fuse with much difficulty.

Calamine. H.=4.5–5; G.=3.15–3.19; white, greenish, bluish; orthorhombic in crystals; B. B. fus. with great difficulty, reaction for zinc and none for iron; hydrous.

Sepiolite. White; soft and almost clay-like, also fibrous; B. B. fuses with difficulty, with cobalt solution; reddish; hydrous.

Pyrosclerite. H.=3; G.=2.74; micaceous; B. B. fuses on thin edges.

c. Anhydrous.

a. No reaction for sulphur; no coating on coal.

Nephelite. H.=5.5–6; G.=2.5–2.65; hexagonal prisms and massive; vitreous, with greasy lustre; white, ywh, gyh brown, rdh; B. B. fuses rather easily.

Wollastonite. H.=4.5–5; G.=2.75–2.9; white, gyh, rdh, bnh; B. B. fuses easily.

Sodalite. H.=5.5–6; G.=2.13–2.4; white, blue, reddish; in dodecahedrons and massive; B. B. fuses not very easily.

Willemite. H.=5.5; G.=3.9–4.3; white to greenish, reddish, brownish; B. B. glows and fuses with difficulty; reaction for zinc and none for iron; anhydrous.

β. Reaction for sulphur B. B. with soda.

Hauynite. H.=5.5–6; G.=2.4–2.5; blue, greenish; isometric, in dodecahedrons, octahedrons; B. B. fuses with some difficulty.

Danalite. H.=5.5–6; G.=3.427; isometric; flesh-red to gray; B. B. fuses rather easily, and gives reaction for manganese and zinc.

B. Not Gelatinizing.

1. STRUCTURE EMINENTLY MICACEOUS, SURFACE OF FOLIA MORE OR LESS PEARLY; H OF SURFACE OF FOLIA NOT OVER 3.5; ANHYDROUS OR HYDROUS.

Muscovite, Biotite, Philogopite, Lepidolite, Lepidomelane. Anhydrous, or affording very little water; B. B. fuse with difficulty on thin edges, excepting lepidomelane, which fuses rather more easily.

Margarodite, Damourite. Much like common mica, but more pearly and greasy to the feel, folia not elastic; giving a little water in the closed tube; color usually whitish.

Pennine, Ripidolite, Prochlorite. Usually bright or deep green, blackish-green, reddish, rarely white; folia tough, inelastic; B. B. diff. fus., reaction for iron and yield much water: partially decomposed by acids.

Vermiculite, Jefferisite. Brown, yellowish-brown, green; exfoliate remarkably; yield much water.

Margarite. H.=3.5–4.5; (highest on edges); G.=2.99; white, ywh, rdh; folia somewhat brittle; B. B. fuses on thin edges; yields a little water.

Talc. H.=1–1.5; G.=2.5–2.8; pearly and very greasy to the touch; white, pale green, gray; B. B. very difficultly fusible, yields usually traces of water; reddish with cobalt solution.

Pyrophyllite. Similar to talc, but B. B. exfoliates remarkably; blue with cobalt solution.

Fahlunite. Has often a more or less distinct micaceous structure.

Autunite. Has a mica-like basal cleavage; but it occurs in small square tables of a bright yellow color. *Diallage*, has a structure nearly micaceous. *Serpentine*, is sometimes nearly micaceous, but the folia are not easily separable and are brittle. *Chloritoid*, has a perfect basal cleavage, but folia very brittle, and cleavage less easily obtained than in the preceding; and moreover the mineral is infusible.

2. Structure not micaceous.

a. Hydrous.

a. No reaction for phosphorus, or boron.

† Hardness, with the exception of a variety of serpentine, 1 to 3; lustre not at all vitreous.

Chlorites. H.=2–2.5. Here fall the massive granular chlorites, olive-green to black in color, of the species *penninite*, *ripidolite*, *prochlorite;* B. B. reaction for iron, fuses with difficulty; yields much water.

Vermiculite. H.=1–1.5. Granular massive forms of vermiculite.

Talc. H.=1–1.5. Here falls steatite (soapstone) or massive talc, of white to grayish green and dark green color, granular to cryptocrystalline in texture. B. B. fuses with great difficulty, and yields only traces of water; no reaction for iron, or only slight.

Pyrophyllite. Grayish-white, massive or slaty; B. B. like the crystallized in its difficult fusibility and little water yielded, but does not exfoliate.

Serpentine. H.=2.5–4; G.=2.36–2.55; olive-green; ywh green; blackish-green, white; B. B. fuses with difficulty on thin edges; yields much water.

Pinite. H.=2.5–3.5; G.=2.6–2.85; lustre feebly waxy; gray, gnh, bnh. B. B. fuses; yields water.

Damourite. Same as crystallized, but in massive aggregation of scales.

†† Hardness 3.5–6.5; lustre often pearly on a cleavage surface, but elsewhere vitreous.

Prehnite. H.=6–6.5; G.=2.8–3; pale green to white; crystals often barrel-shaped, made of grouped tables; B. B. fuses very easily; decomp. by HCl.

Pectolite. H.=5; G.=2.68–2.8; white; divergent fibrous, or acicular; B. B. fuses very easily; gelatinizes imperfectly with HCl.

Apophyllite. H.=4.5–5; G.=2.3–2.4; white, gnh, ywh, rdh; dimetric, one perfect pearly cleavage transverse to prism; B. B. fuses very easily; a fluorine reaction; decomp. by HCl.

Chabazite. H.=4–5; G.=2–2.2; rhombohedral, vitreous; white, rdh; B. B. fuses easily; decomp. by HCl.

Harmotome. H.=4.5; G.=2.44; white, ywh, rdh; crystals twins, usually cruciform; B. B. fuses not very easily; vitreous in lustre; decomp. by HCl.

Stilbite. H.=3.5–4; G.=2–2.2; white, ywh, red; crystallizations often radiated, lamellar; one perfect pearly cleavage; B. B. exfoliates, fuses easily; decomp. by HCl.

Heulandite. H.=3.5–4; G.=2.2; in oblique crystals, with one perfect pearly cleavage; B. B. same as for stilbite.

Euclase. H.=7–5; G.=3.1; in glassy transparent monoclinic crystals; B. B. fuses with great difficulty; gives water in closed tube *when strongly ignited.*

Prehnite, *apophyllite*, *chabazite*, *harmotome*, *heulandite*, and *euclase* never occur in fibrous forms.

b. Reaction either for phosphorus or boron.

Vivianite. H.=1.5–2; G.=2.55–7; monoclinic with one perfect cleavage; white, blue, green; B. B. fuses very easily, the flame bluish-green, a gray magnetic globule; in HCl sol.

Ulexite. H.=1; G.=1.65; white, silky, in fine fibres; B. B. fuses very easily, and moistened with sulph. acid flame for an instant green, owing to the boron present; little sol. in hot water. *Priceite* is in texture and color like chalk; similar to ulexite in green flame B. B.

Borax and *Sassolite* are other soft minerals containing boron, but these have *taste.*

b. Anhydrous.

a. B. B. the flame lithium-red.

Spodumene. H.=6.5–7; G.=3.13–3.19; white, gyh, gnh, white, monoclinic (like pyroxene), with I ∧ I=87°, and perfect cleavage parallel to I and *i-i*; B. B. swells and fuses.

Petalite. H.=6–6.5; G.=2.4–2.5; white, gray, rdh, gnh; B. B. becomes glassy and fuses only on the edges.

Hebronite, Amblygonite. H.=6; G.=3–3.1; mountain-green, gyh, white, bnh; B. B. fuses very easily, reaction for fluorine.

Triphylite. H.=5; G.=3.5–3.6; greenish, gray, bluish, often bnh black externally; B. B. fuses very easily, globule magnetic; with soda, manganese reaction.

Lepidolite. H.=2.5–4; G.=2.8–3; micaceous, also scaly-granular; rose-red, pale violet, white, gyh; B. B. fuses easily; after fusion gelat. with HCl. Some *biotite* gives the lithia reaction.

β. B. B. boron reaction (green flame).

Tourmaline. H.=7; G.=2.9–3.3; rhombohedral, prisms with 3, 6, 9 sides, no longitudinal or other distinct cleavage; black, blue-black, green, red, rarely white; lustre of dark var. resinous; B. B. fusion easy for dark var. and diff. for light.

Axinite. H.=6.5–7; G.=3.27; triclinic, sharp edged, glassy crystals; rich brown to pale brown and grayish; B. B. fuses readily; with borax violet bead.

Boracite. H.=7; G.=2.97; isometric; white, gyh, gnh; lustre vitreous; fuses easily, coloring flame green.

Danburite is another boron silicate.

γ. B. B. reaction for titanium.

Titanite. H.=5–5.5; G.=3.4–3.56; monoclinic; usually in thin sharp-edged crystals; brown, ywh, pale green, black; lustre usually subresinous; B. B. fuses with intumescence.

δ. Reaction for fluorine or phosphorus.

Cryolite. H.=2.5; G.=2.9–3; white, rdh, bnh; *fuses in the flame of a candle;* soluble in sulph. acid which drives off hydrogen fluoride, a gas that corrodes glass.

Fluorite. H.=4; G.=3–3.25; isometric, with perfect octahedral cleavage, and massive; white, wine-yellow, green, purple, rose-red, and other bright tints; phosphoresces; when heated, decrepitates; B. B. fuses, coloring the flame red; after ignition, alkaline.

Lepidolite, Amblygonite also give a fluorine reaction.

Apatite. H.=4.5–5; G.=2.9–3.25; often in hexagonal prisms; pale green, bluish, yellow, rdh, bnh, pale violet, white; B. B. fuses with difficulty, moistened with sulph. acid and heated, flame bluish-green from presence of phosphorus; sometimes reaction for fluorine.

ε. Reaction for iron.

Garnet. H.=6.5–7.5; G.=3.15–4.3; isometric, usually in dodecahedrons and trapezohedrons, also massive, never fibrous or columnar; rdh, bnh red, black, cinnamon-red, pale green, to emerald green, white. B. B. dark-colored varieties fuse easily, and give iron reaction, but emerald-green var. almost infusible; a white to yellow massive garnet is hardly determinable without chemical analysis.

Vesuvianite (Idocrase). H.=6.5; G.=3.35–3.45; dimetric and often in prisms of four or eight sides, never fibrous; brown to pale green, ywh, bk; B. B. fuses more easily than garnet; reaction for iron.

Epidote. H.=6–7; G.=3.25–3.5; in monoclinic cryst. and massive, rarely fibrous; unlike amphibole in having but one cleavage direction; ywh green, bnh green, black, rdh, yellow, dark gray; B. B. fuses with intumescence.

Amphibole, dark varieties including *hornblende, actinolite,* and other green to gray and black kinds, H.=5–6; G.=3–3.4; monoclinic, in short or long prisms, often long fibrous, lamellar, and massive, prisms usually four or six sides, I ∧ I=124½°, cleavage par. to I, B. B. fusion easy to moderately difficult.

Anthophyllite, like hornblende; bnh gray to bnh green, sometimes lustre metalloidal; B. B. fuses with great difficulty.

Pyroxene, augite, and all green to black varieties. H.=5–6; G.=3.2–3.5; mono-

clinic, in short or oblong prisms, lamellar, columnar, not often long, fibrous or as bestiform, prisms usually with four or eight sides, I $\wedge$ I=87° 5′; cleavage par. to I; B. B. as in hornblende.

Hypersthene. H.=5–6; G.=3.39; cryst. nearly as in pyroxene, but trimetric, usually foliated massive, also fibrous; bnh green, gyh black, pinchbeck-brown; B. B. fuses with more or less difficulty. *Bronzite* is similar and almost infusible.

Iolite. H.=7–7.5; G.=2.6.–2.7; blue to blue violet; looks like violet-blue glass; B. B. fuses with much difficulty.

Tourmaline, much *Titanite*, and *Ilvaite*, B. B. give iron reaction.

ζ. No reaction for iron.

Scheelite. H.=4.5–5; G.=5.9–6.1; ywh, gnh, rdh, pale yellow; lustre vitreous—adamantine; fuses on the edge with great difficulty.

Scapolites. H.=5.5–6; G.=2.6–2.74; dimetric, often in square prisms; white, gray, gnh gray; B. B. fuses easily with intumescence.

Zoisite. H.=6–6.5; G.=3.1–3.4; trimetric, oblong prisms and lamellar massive, cleavage in only one direction.

Amphibole, *white var.* (*tremolite*), same as for other amphibole (above), except in color; B. B. fuses.

Pyroxene, *white var.* same as for other pyroxene (above), except in color, B. B. fuses.

Orthoclase. H.=6–6.5; G.=2.4–2.62; monoclinic, stout cryst., and massive, never columnar, two unequal cleavages, the planes at right angles with one another, and cleavage surfaces never finely striated, as seen under a pocket lens or microscope; white, gray, flesh-red, bluish, green; B. B. fuses with some difficulty.

Albite, Oligoclase. H.=6; G.=2.56–2.72; triclinic, but cryst. as in orthoclase, except that the two cleavage planes make an angle of 93½° to 94°, and one of them has the surface striated; white usually, flesh-red, bluish; B. B. fuse with a little difficulty; not acted on by acids.

Labradorite. H.=6; G.=2.66–2.76; triclinic, like albite in cryst., and nearly in cleavage angle, 93° 20′, and in striæ of surface; white, flesh-red, bnh red, dark gray, gyh brown; B. B. fuses easily; decomposed by HCl with difficulty.

Anorthite. H.=6–7; G.=2.66–2.78; cryst. and striæ as in albite, cleavage angle 94° 10′; white, gyh, rdh; B. B. fusion difficult; decomposed by HCl with separation of gelat. silica.

Microcline. Very near orthoclase in all characters, but triclinic, cleavage angle differing only 16′ from a right angle, and surface of most perfect cleavage striated, but striæ exceedingly fine, often difficult to detect with a good pocket lens, and requiring the aid of a polariscope; color white, gray, flesh-red, often green.

Euclase. H.=7.5; G.=3.1; in monoclinic crystals, with one perfect diagonal cleavage; pale green to white, bnh; transparent; becomes electric by friction.

GOLD.

Gold, specific gravity 19.3, is a brilliant, lustrous, heavy metal, of a lordly appearance and magnificent yellow—golden yellow—color. There is but one color to gold, and all the variations from that color simply prove the presence of alloys and the impurity of the gold, or whatever goes by that name. It is a saying among the miners that a "great many other things are mistaken for gold, but gold is never mistaken for anything else." It is about as difficult to say certainly where gold comes from as where it goes to, as at both ends of its course it is in the smallest possible particles.

About the bottom fact now known about gold is that all *original* iron pyrites of small grain texture contain gold to a greater or less extent. Of course this does not cover such secondary large crystal pyrites as those found in the coal measures and elsewhere, but only the pyrites in veins or comparatively unaltered pyritous deposits derived from veins. It is not yet known whether the gold in these pyrites is in chemical combination with sulphur as a sulphide of gold, or whether each minute particle of gold is simply covered with a coating of sulphide of iron, or whether the pyrites is a double sulphide of iron, or whether the particles of gold are in the metallic state, but alloyed with silver or other metal which combines more readily with sulphur than the gold does, and consequently forms a coat of sulphide of silver, etc., over the gold. The particles of gold are so minute, and the combinations, dissociations and re-combinations follow

so rapidly during the splitting up of these pyrites, that the finest instruments and tests known to chemistry have as yet been unable to settle this part of the question to the satisfaction of all concerned.

Gold is found not only in the sulphide veins, but also in the crystalline or quartz, and composite veins, formed during the dislocation and upheaval of rocks. Quartz that looks like coarse grained white sugar is a good sign, but clear rock crystal quartz, or quartz with a glassy vitreous lustre, with no grains in its texture, never holds gold. The granular quartz in veins, badly stained with iron rust, and full of little sharp-cornered cells with iron dust in them, is the best prospect, and when this quartz is in streaks or sheets standing on edge, and intercalated between sheets of all sorts of yellow and brown minerals, and some sulphides of iron and copper, all filling up a vein which has masses of brown spongy iron ore or "gossan" scattered over the surface at its outcrop, then the prospect requires immediate attention. The mass of one of these veins may yield from $20 to $50 per ton by the usual rough processes, and yet not a particle of gold can be seen in the rock with the naked eye, and a powerful glass reveals but few specks.

These sulphide veins are the original home of the gold so far as we know, and their location is nearly always in the talcose slates of the Huronian formation, although, in rare cases, they can be traced upward into the bottoms of the Lower Silurian or whatever rock immediately overlies the slates. Many veins show soft, decomposed and earthy rock and mineral filling the fissure for some hundreds of feet down from the outcrop to the water level of the country, and so far things go on comfortably; but when the sulphides are hard and bright and sharp cornered, and the water gets troublesome, it is more than time for the mining engineer to come with his de-sulphurizing furnaces and scientific processes.

Frequently whole beds of these talcose slates will be found pierced in many directions by many systems of veins or seams of all sizes, from a mere ribbon set on edge up to many feet in thickness; and where many thin veins are found, the whole mass of rock is crushed, instead of attempting to mine out any one vein. This plan of crushing the whole mass is also used where the slate beds are filled with small grains of quartz and pyrite, or little cells where the pyrite has been oxidized, this slate being simply an old bed of sand, mud, etc., which has been washed down from some earlier rock with a pyrite vein in it. Where such a washed down bed of debris has existed long enough to have become compacted into a rock, it is a gold bearing bed of rock; but where the washing down process took place in recent times it is a gold bearing bed of mud, clay, sand, gravel, or anything else, and it is a wet or dry "diggings," according to its location above or below water level. Whole hills of sand, gravel and clay may have gold distributed throughout their entire mass, or the gold may be in a "streak" or "lead" running through the hill at a certain height or on the bed rock.

Gold occurs in all these secondary deposits, not as in veins, in particles too fine to be detected, but as "wash" gold in grains from dust size up to the nuggets of many pounds weight. That this wash gold is derived from the vein gold is a fact acknowledged by all; but how the fine particles became agglomerated into nuggets or grains is an unsolved question, although thinkers and observers in great number have advanced endless theories about electricity, galvanism, precipitation, cold welding, etc., but so far, all the facts are not accounted for.

Another obscure point in the history of gold is that in the quartz veins, free from sulphur, the gold is sometimes found in grains, nuggets, sheets or strings, looking as though it had been melted, leading to the conclusion that these quartz veins have been reduced by heat from very siliceous sulphide veins, or that the quartz has come up from below in a melted state, and after passing through sulphides and driving off the sulphur has brought the gold up with it. Something of this kind is indicated by the fact that auriferous quartz contains no water of crystallization, differing in this respect from the crystalline varieties with shining surfaces or transpareut bodies. Free gold quartz veins, when washed down, yield gravel diggings containing coarser wash gold than gravels derived from sulphide veins.

Gold in the sulphides and clays may be so fine as to be really invisible except under a powerful microscope; and small as the particles are, they are nearly always flat and just fitted to float away with any current of water that will carry off the mud. The best plan with fine stuff, it is said, is to let water alone, and pulverize everything to the finest possible condition, with mercury in the mill, and no water to get between it and the gold, then blow this powdered rock or clay and the amalgam all together through a long, horizontal revolving pipe, with a bright pool of mercury in the bottom and

rings or dams at short intervals to deflect the current of air and dust, etc., to impinge upon the constantly fresh, rolling surface of the mercury, which captures the drifting particles of amalgam, while the lighter rock and iron dust float on with the air-current. An air-current of two *feet* per second will not float dust and scale gold that a water-current of two *inches* per second would carry off with ease, and the air-current thus enables us to work with very much more finely pulverized material than the water-current. One of the great troubles with all water processes is the great waste of gold in the "slimes," these being simply those portions of the vein-stones that have been pulverized too fine for the rough processes inseparable from the use of water, but which slimes are just in the most convenient size of grain for the gentle air current to blow away, leaving the gold behind in the mercury pipe. It must be remembered that the gold in the sulphides is in the finest possible condition for gold, and the sulphides containing it must be pulverized to at least the fineness of the gold, or *all* the gold is not freed from its imprisonment; and it is further to be remarked, that the gold being soft and tough, can be flattened into scales by further trituration, but cannot be broken into smaller particles, although the vein-stone can go on being pulverized finer and still finer, until it is so much lighter and smaller than the gold as to be floated out by an air-current that will not even lift the scales in spite of the fact that the pulverized rock is in globules or cubes. Another point is that the more the particles of gold are flattened out into scales by dry crushing in contact with mercury, just so much the greater (and the brighter) is the gold surface for the mercury to lay hold of it and hold it down by adding the weight of the mercury to that of the gold while the rock-dust blows away. Just the opposite of this is the case with the water process, where the more the gold is flattened and brightened the more easily it is floated over the surface of the mercury, by reason not only of the water getting between them, but also by the film of air which isolates the gold in the water by floating it and by keeping a membrane of water around the air again. It is well to remember also that air can always be had even in the most inaccessible mountain ledges, while water is not always easily obtained.

A good test is to pulverize the vein-stone and dissolve it in aqua regia (nitric and hydrochloric acids), then pour in a solution of copperas (sulphate of iron), which will precipitate the gold (if there is any) in a brown powder to the bottom of the glass; rub this powder with a knife and it reveals its true gold color. The relative weight of the gold thus obtained, when compared with the weight of the original vein-stone, will give the rate of yield if it was a fair average sample.

Mica and the two sulphides of iron and copper are more often mistaken for gold than any other substance; but by remembering that mica is in bunches of sheets, that iron pyrite is hard and angular and brittle, that copper pyrite is soft and brittle and cuts into powder, but that gold is not in bunches of sheets, is not sharp cornered nor brittle and hammers out flat, can be cut into threads without crumbling, mistakes will be avoided, especially when note is taken of the great weight of gold when compared with the substances mentioned.

SILVER.

Silver, specific gravity 10.53, is an excessively brilliant pure white metal, of great malleability and ductility. It is harder than gold, but softer than copper, and can be cut with a knife when pure; but a very little alloy hardens it disproportionately. It is found naturally in the metallic state (but never entirely pure), and also in combination with other substances forming ores. The metallic silver, as found native, generally has a slightly darkened and dull looking surface, but reveals its true color when cut or scratched.

Silver Glance, or Sulphide of Silver, gravity 7.0, contains 86 per cent. silver and 14 of sulphur. It is dark grey to blackish in color, dull externally, but showing a vitreous metallic lustre when cut; and can be cut as easily as lead and is slightly malleable—gives off sulphur smell when heated. This is the great ore of silver, and can be found in nearly all the formations except the coal rocks. It is rarely pure, and never forms the entire metallic contents of a vein. Lead veins nearly always contain this ore mixed with the galena. Galena, that is small grained, is always argentiferous, but the large grained galena rarely has it in paying quantities. The sulphides of zinc and antimony, and frequently copper, will bear testing for silver glance. The limestones of the Silurians and Devonians are the most likely places to find silver-bearing lead ores; and next after these, the slate rocks of the upper primaries.

Red Silver, gravity 6 to 6.5, when dark red in color, contains 60 per cent. silver, 20 of antimony, 12 of sulphur, and 8 of oxygen; is almost opaque, has a metallic lustre, and is usually found in crystals. When it is clear transparent red color, it is a double sulphide of silver and arsenic, and contains 65 per cent. of silver.

Horn Silver, gravity 5.5, is chloride of silver, contains 75 per cent. silver and 25 of chlorine. It looks like pearly grey putty or wax, sometimes slightly bluish. The exposed portions on the outcrops of veins look like brown or black cement. It is soft, easily cut, and can be hammered out slightly.

Silver Amalgam, gravity 14, is much heavier than pure silver, as it contains 64 per cent. mercury to 36 of silver. It has a very bright silver-white color, is very soft, and can be cut with a knife. It is really not an *ore* of either silver or mercury, but simply an alloy or mechanical combination of two native metals. It is one of the principal sources of silver in South America, but has not yet been extensively found in North America.

All silver ores are to be looked for in any kind of veins in any of the rocks below the coal measures. All sulphide veins of copper, antimony, zinc or lead, need testing for silver, as they are nearly always found associated. The silver may not be in paying quantities, but that can only be asserted positively after testing. All galena that is fine grained, and not plainly cubical in texture, may be confidently examined for silver.

To test mineral for silver, dissolve a piece in nitric acid, pour in strong salt water, and if the resulting white powder should turn black on exposure to sunlight, it contains silver.

IRON.

Iron, specific gravity 7.78, is a silver-white fibrous and ductile metal, and the most valuable to man of all earth's mineral productions except coal. It is the strongest of all metals, as well as the most universally diffused, some one or other of its ores being found in all the formations. It is susceptible of very high polish, but its affinity for oxygen is so great that it tarnishes very easily, and is never found entirely pure in a state of nature. Some nearly pure bits and small masses have been found in many ore-veins, but always show traces of having been reduced from the ores by heat or precipitation from solutions. Masses of nearly pure iron occurring as shooting stars or meteors are frequently found where they have fallen, but are preserved from further oxidation by a glazed or vitrified surface, caused by the heat from friction with our atmosphere during their rapid passage through it. The iron supply of the world is entirely drawn from the natural ores of this metal, the few specimens of native metallic iron being useful only as cabinet specimens.

Magnetite, or Black Oxide of Iron, Loadstone, Magnetic Ore, etc., gravity 5.1, is a proto-sesqui-oxide of iron, in the proportion of 72 per cent. of iron and 28 per cent. of oxygen, when the mineral is unmixed with impurities. It is black in color; has metallic lustre; its powder is black and it occurs crystalline and granular, sometimes earthy and compact, but crumbles easily into coarse black sand, and is attracted by the magnet. It is found principally in veins and beds throughout the primary rocks, and sometimes in the sandstones, etc., lying immediately upon the primaries.

Gray Oxide, gravity 5.0, is the sesqui-oxide, and contains 70 per cent iron to 30 of oxygen. This ore is the specular hematite, is of steel-gray color, of high metallic lustre, and its powder is red. It is brittle and crystalline, and frequently slaty in structure, and is found principally in beds in the primary rocks, or those immediately overlying them, and the black oxide is nearly always in company with it, being of similar early origin.

Red Oxide, gravity 5.0, is also the sesqui-oxide, and contains 70 per cent. of iron to 30 of oxygen, when pure. This ore is properly called hematite, (meaning blood-red ore,) inasmuch as it is red both in mass and in powder. It is of secondary origin, being derived from the foregoing oxide by being powdered, washed off, and re-deposited in secondary beds which retain the red color of the powder from which they were built. This ore is sometimes deposited as regular beds or strata of rock, and for long distances—frequently hundreds of miles—it holds its position as a member of a formation.

Brown Oxide, gravity 4.0, contains 60 per cent. iron, 26 oxygen and 14 of water. Its proper name is limonite, and it is frequently called brown hematite, apparently because it is *not* blood colored either in mass or in powder. It is a hydrated sesqui-oxide of iron, and appears to be derived from the foregoing oxides by being carried off and

re-deposited from a *solution*, whereby it enclosed its water of hydration, while the red oxide was simply carried off in *suspension* as powder. The brown oxide is brown, yellow, or purplish brown or black, but its powder is always yellow. It is generally compact and frequently massive, and like the dry oxides it often forms great cliff formations in the structure of hills and mountains. This ore is rarely gritty, but sometimes granular; and a very pure and valuable variety looks just like a black iron sponge, having a vitreous lustre when broken. Sometimes it occurs in hollow balls, with the interior surface covered with black velvety crystals; and when these balls are fibrous in texture, the fibres radiating from the centre to the circumference, it is called needle ore. Sometimes it is in masses in wet lands, either as concretions, or as masses of hard brown earth, loosely packed, when it is bog ore. It puts on more different appearances than any other ore, and owing to its deposit from solution it has been carried everywhere that water can reach, and may be looked for in all the formations. In one shape or another it is the most valuable of American iron ores.

Carbonate of Iron, gravity 3.5 to 4.0, sometimes called Siderite, Chalybite, Sparry or Spathic Iron, according to circumstances, is of many varieties, but the definite mineral contains 42 per cent. of iron, 20 oxygen and 38 of carbonic acid and other impurities. It is never found naturally pure, but always mixed with sand, lime, clay, &c., and is a clay iron stone, properly speaking, in America. It occurs in the secondary and later formations, and is most abundant in the coal measures, but the nodular ores of the tertiary clays, such as those from which the best Baltimore Iron is made, are carbonates. It may be of any color or shape from white, gray or yellowish masses to brownish, purple nodules, looking like fragments of exploded shells, or from flattened balls to the full black band ores of the coal measures of Western Kentucky or of England. It is also found in beds intercalated between other rocks, sometimes in a continuous massive formation looking like gray or yellowish limestone, but more frequently the ledge is a mass of flattened balls or kidneys of large size, mixed with smaller balls and grains of the same ore, with a lime cement, and the outcrop of such beds or ledges is generally weathered into brown, spongy-looking masses of limonite. It is not one of the most valuable of American ores, where we have so much more of the richer oxides, but the "Black Band" and the "Clay Band" carbonates of England have heretofore produced more than half the iron supply of the world. In America we use the carbonates chiefly for mixing and tempering the richer oxides.

Pyrite.—Iron Pyrites or Fool's Gold, gravity 5.0, is a bisulphide of iron, and contains 54 per cent. of sulphur to 46 per cent. of iron. The rule among iron-masters is to call anything an iron ore which contains 20 per cent. of iron, but nobody has yet made iron out of Pyrite, because no economical process of eliminating all the sulphur has yet been discovered, and the merest trace of sulphur in iron renders it worthless for most purposes. The manufacturing chemists, however, make great quantities of sulphur and sulphuric acid, alum and sulphate of iron or copperas out of it, and when heavy veins of this mineral are well located for work and transportation they are worth looking after. The mineral itself is either whitish yellow or brass colored, is generally a mass of cubic crystalline blocks of all sizes, and each block breaks up into smaller cubes. These are very hard, will scratch a knife-blade or strike fire with steel like flint; are very brittle, and will give off stifling fumes of sulphuric acid when burned in a candle flame. Pyrite occurs in scattered crystals or masses throughout the coal measures, and sometimes in the coal itself, in which case its presence diminishes the value of the coal, as iron cannot be worked with it. The principal deposits of Pyrite, however, are in veins in the primary rocks, and frequently such veins extend upwards into whatever rocks immediately overlie the primaries. These veins are nearly always indicated on the surface by spongy masses of brown oxide of iron, as in the case of the carbonates, the outcrop of the vein giving up its sulphur and becoming oxidized by exposure to the weather. Another variety of these Pyritous veins contains arsenic, and the mineral is then called Mispickel. It is of gravity 6.0, contains 34 per cent. iron, 20 of sulphur and 46 of arsenic; has a silver-white color, high metallic lustre, is very hard, and smells of garlic when heated. It is a good ore of arsenic, but not for iron. The iron pyrite veins when in the primary rocks, and of very small grained texture, can be looked into for gold with confidence.

Iron Paint, or Ochre, is simply oxide of iron, either naturally or artificially triturated to an impalpable powder, either pure or mixed with clay or other material. The Limonite oxides give yellow paint, and the Hematic gives red, while the Magnetic gives black paint. Iron does not become red until it is combined into the sesqui-oxide, containing 30 per cent. of oxygen and 70 of iron, although some over-zealous paint makers guarantee a red paint containing 90 per cent. of metallic iron.

COPPER.

Copper, specific gravity 8.9, is of fine red color, very soft and ductile, takes a high polish, but quickly tarnishes again by coating with oxide and carbonate of copper. Its tenacity is nearly as great as that of iron, but its elasticity is very low. It is found native in grains and masses in nearly all veins carrying copper ores.

Such mines as the Calumet and Hecla, near Lake Superior, where they stamp and wash 800 tons per diem of rock containing 5 per cent. of its weight in *shot copper* or copper dust, are the paying mines. In the early days of copper mining on Lake Superior, a good yield of copper was obtained by small gangs of men washing out the sands and gravels from the stream bottoms below veins, as is done in gold districts; but the business was very small, and soon abandoned for regular mining.

A peculiarity of this Lake Superior copper is that much of it contains silver, not as an alloy regularly combined, but simply disseminated through the mass, in globules, from the size of a pin-head to that of a walnut. These great copper veins are all powerful disturbers of the magnetic needle.

Cuprite, or Red Oxide of Copper, gravity 5.9, contains 88 per cent of copper and 12 of oxygen. It is of a deep blood red color, semi-metallic lustre, and is generally in crystals, either cubic or octagonal. It is found in nearly all copper veins, being a product of the oxydation of some other ore, or of metallic copper itself, but it is never the principal ore of a vein.

Melaconite, or Black Oxide of Copper, gravity 5.5, contains 72 per cent copper and 28 of oxygen, is black, dark blue or brown color and velvety in appearance. Is found with cuprite in all copper veins, as a result of the oxydation of other ores, and sometimes, as at Ducktown in Tennessee, it is one of the most valuable zones of the mines.

Chalcopyrite, or yellow Sulphide of Copper, or Copper Pyrites, gravity 4.2, contains properly 35 per cent. of copper, 30 of iron and 35 of sulphur, but the proportions are liable to all sorts of variations. It has a yellow brassy color and bright metallic lustre, but tarnishes easily. It is quite soft, and can be shaved into powder with a knife. A bright yellow and soft ore is apt to be rich, while a whitish yellow, dull colored and hard ore is poor, owing to the greater quantity of iron present. This chalcopyrite is always accompanied by pyrite, and in general the top of the vein is a brown spongy iron ore for a certain distance, then pyrite, with a little chalcopyrite, and this latter increases downwards until at a couple or three hundred feet the veinstone carries chalcopyrite almost entirely, after which it is valuable.

Chalcocite, or Grey Sulphide of Copper, gravity 5.0, contains variably 25 to 65 per cent. of copper, 20 to 30 of sulphur, and a remainder made up of iron, zinc, antimony, arsenic and other nuisances, but it is, nevertheless, a very easy ore to work. It is steel-gray in color, dull surface and rather soft and brittle, and melts easily in the flame of a candle. Occurs in veins with pyrite and chalcopyrite, either massive and crystalline or granular. It is proper to say that the bi-sulphide of copper, which forms the basis of both chalcocite and chalcopyrite, and which does not occur as a natural product pure, contains 78 per cent. of copper to 22 of sulphur, and looks very much like metallic iron, and that the more closely chalcocite approaches bi-sulphide in composition, the richer it is.

Silicate of Copper, gravity 2.1, is a compound of oxide of copper, with silica and other impurities, and contains 30 to 35 per cent. of copper. It is bluish-green in color, resinous or dull glassy lustre and texture, and its fracture is like that of glass, but it is soft and easily cut with a knife, turns black when heated. This is generally rather a fancy material, but is sometimes found in the Southern and Pacific coast mines in large masses accumulated by incrastations at and near the outcrops of the veins of other copper ores, but never constitutes a vein by itself, being simply a product of secondary action on the sulphides. It is a valuable ore, and profitable according to its quantity.

Malachite, or Green Carbonate of Copper, gravity 4.0, contains 56 per cent. copper, 14 of oxygen, 22 carbonic acid and 8 of water. It resembles green marble with banded or wavy structure, is found as a precipitation in veins of other copper ores, and when in plates of any size is valuable for mantels, table tops, vases, and for all sorts of ornamental work. It is also used in jewelry, and when in large and well-shaped pieces, and of beautiful color and texture, it commands a very high price, although as a source of copper it is of no importance.

Azurite, or Blue Carbonate of Copper, gravity 3.8, is of substantially the same composition as malachite, but is of a beautiful blue color, and occurs in nodules and concretions. It is used only as an ornamental material, and can be distinguished from the

blue silicate by its clearer and more gem-like appearance, and by the fact that it effervesces with acid, which the silicate does not.

In general: it may be said of copper ores that they are distinguished by liveliness of colors; that they are soft; that they impart their colors to other substances by rubbing; that they nearly all turn bright green on long exposure; and that they occur only in veins in the primary rocks or rocks immediately overlying them, or in igneous rocks. In Colorado the veins are in granitic rocks, and are much given to producing malachite and cuprite ores, as well as the sulphides.

PLATINUM.

Platinum is a bright white metal, very like silver in appearance. Its specific gravity is 21.15, when pure, being the heaviest *known* metal. It is both malleable and ductile; welds like iron at a red heat, but cannot be melted by any heat less intense than that of the compound blow pipe. It does not oxidize or tarnish, and is not attacked by any *single* acid. It is never found as an ore, nor yet pure, but always in the metallic form alloyed with other metals, and one of the most tedious processes in chemistry is that for purifying platinum. It is nearly always alloyed with the metals Osmium, Rhodium, Iridium and Palladium, one or two of which are thought to be as heavy, if not heavier, than the Platinum, but the quantities for testing this are so minute as to make accuracy difficult. Platinum is found along with gold in the sands of the streams of the primaries. It is in flattened grains and small masses, the native alloy having a gravity of 17 to 19, and having generally angular corners and occasionally black dots on the dull white surface of the grains. It is found with gold in Russia, Australia, South America, and in the United States, but only sparingly in this latter country.

MERCURY.

Mercury or Quicksilver, specific gravity 14.4, is a brilliant silvery white metal liquid at ordinary temperature, but freezes solid at 40 degrees below zero—Fahrenheit—and when thus frozen can be hammered out into plates or drawn into wire, and can be welded like iron. It occurs naturally in the metallic state in globules, disseminated through the rocks, as the result of natural reduction from its principal ore, the sulphide of mercury or cinnabar.

Cinnabar, gravity 9.0 to 10.0, contains 80 to 90 per cent. of mercury, and 10 to 20 of sulphur, is a vermillion red granular ore, sometimes in compact masses, and again like loose red earth with a yellowish tinge. It will evaporate entirely if thrown on a red hot shovel. This ore is the only ore of mercury worth looking for, and all the mercury we know of is in the rocks above the lower primaries, owing to its extreme volatility. It is rarely found actually in veins, but is apt to be disseminated through the neighboring rocks, no matter what rocks they may be. In California much mercury is obtained from tertiary rocks which have been impregnated with mercurial vapors during the heating up of things, while neighboring dykes of serpentine or veins of other metallic sulphides were being filled. There are other places where serpentine masses have themselves been impregnated with mercury during the outflow of later dykes or veins. Whole beds of Silurian slates are sometimes impregnated with metallic mercury and cinnabar, and it has been found in the coal measures in bituminous shales, but always near some dyke or outflow of igneous or eruptic rocks. Minute seams or large pockets of cinnabar occur irregularly throughout the rock as well as the smallest grains, and frequently these pockets are lenticular in shape and are really portions of veins. The recently discovered Sulphur Banks in California (which have knocked down the price of quicksilver 20 per cent.) constitute some hundreds of acres of a hill on Clear Lake, and the whole hill is a mass of volcanic rock, impregnated with from 1 to 5 per cent. of its mass of cinnabar. They quarry the rock out in blocks, to be afterwards crushed, and possibly concentrated, before going to the furnaces.

NICKEL.

Nickel, specific gravity 8.82, is a brilliant silver-white metal, very malleable and ductile and does not oxidize at ordinary temperatures, being therefore very valuable for cheap coins, and cheap spoons and other ware. It occurs in the metallic form naturally

only with metallic iron in meteors, and for all practical purposes it is extracted from its ores.

Copper Nickel, gravity 7.0 to 7.5, contains 45 per cent. of nickel to 50 per cent. of arsenic, and 5 of iron, lead, sulphur, etc., but no copper, its name coming from its copper-like appearance. It is hard and brittle, and generally fine grained, and of high metallic lustre. Its powder is almost black, and the fresh surface of the ore soon tarnishes, first to grey, which deepens with time to black.

Sulphide of Nickel, gravity 6.5, contains 65 per cent, of nickel to 35 of sulphur, is a mass of greyish to yellow flexible threads, having a metallic lustre. This material is very rarely found pure, but is nearly always mixed with antimony or with iron pyrites, as follows:

Nickel Glance, gravity 6.5, is sulphide of nickel and antimony, and contains 28 per cent. of nickel, 17 of sulphur and 55 of antimony. It is steel grey in color, metallic lustre, very brittle, and occurs in masses with a granular texture, the grains being almost cubic.

Magnetic Pyrites, gravity 4.5 to 5.0, is a compound of the sulphides of nickel and iron, and contains generally about 20 to 25 per cent. of nickel. It is massive, very brittle, metallic lustre, and dark brass or orange colored. It is slightly magnetic, and although not so rich in nickel as the other ores, it is the source of nearly all the nickel supply by reason of its greater abundance.

All Nickel ores are found in veins in the primary or lower secondary formations, and the ores are rarely found except in association with cobalt ores mixed with the ores of copper, lead and other minerals, as spoken of under the head of cobalt.

COBALT.

Cobalt, specific gravity 8.5, is a lustrous, reddish grey metal, of granular texture, and very brittle. Its texture can vary from granular to fibrous or laminated, according to the degree of heat used in its reduction from the ores. Metallic Cobalt is never found native, and its reduction from its ores is exceedingly difficult, as it is so much like nickel in all its properties, and the two are always associated. Metallic Cobalt is not useful except as specimens in cabinets, etc., but its combinations with oxygen and other elements give us Smalt, and Azure, and Ultramarine, and all the beautiful blue coloring matter for glass.

Arsenical Cobalt, gravity 7.3, is a silvery white mineral, containing 30 per cent. Cobalt, 60 of arsenic, and 10 of iron, copper, sulphur, and other impurities. The silver white color is only on fresh fractures, the external surfaces tarnishing to reddish grey. Texture compact to granular. It is brittle, but can be cut with a knife, and its lustre is metallic.

Cobalt Glance, gravity 6.5, sometimes called Smaltine, contains 35 per cent. Cobalt, 50 of arsenic, 20 of sulphur, and 5 of iron and other impurities. Its color is tin white, with a light red tinge, shining metallic lustre, and is in well defined rather cubic crystals, slightly lamellar in structure. It is not brittle, cuts with difficulty, and both this and Arsenical Cobalt give off an odor of garlic if held in the flame of a candle.

Cobalt Pyrites, Sulphide of Cobalt, gravity 6.3, contains 43 per cent. of Cobalt, 14 of copper, 40 of sulphur, and 3 of iron, etc. Its color is steel gray, inclining to yellow. It is found in grains or granular masses, the grains being cubic in shape.

Oxide of Cobalt, gravity variable as found naturally, looks just like black earthy oxide of manganese or wad, and is nearly always mixed with it, so that the character and value of the mixture depend entirely on it constitution.

The Cobalt ores are always found with nickel ores, in the veins and deposits in the primary and lower secondary formations, and frequently mixed with copper or lead ores, as in Missouri, where in some mines the lead and copper are powdered over with bluish semi-oxidized arsenical and sulphide ores of Cobalt and nickel, and some seams of the clay slates are spangled with dots of these ores.

TIN.

Tin, specific gravity 7.29, is a silvery white metal of high metallic lustre. It is very malleable and soft, but owing to its crystalline texture, it is not ductile, and has almost no tensil coherence, and has, therefore, to be used in alloys or as a coating to other metals. It oxidizes with great difficulty at ordinary temperatures, and is, there-

fore, very useful as a surface coat for other metals such as iron and copper. It is said to have been found pure in Russia and elsewhere in Europe, but only in small grains, and is derived entirely from tin ores for commercial use.

Tin Stone, or Binoxide of Tin, gravity 7.0, contains 78 per cent. of tin and 22 of oxygen. It is a peroxide, *i. e.*, it cannot be further oxidized, and is also called cassiterite. It can be grey, yellow, red or black in color, is of a brilliant lustre, and hard enough to strike fire on steel. It is found in veins in the granites and slates of the primaries, and is also found as grains in the beds of streams, and is then called *stream-tin*. It is the principal ore of tin, and produces perhaps 95 per cent. of all the tin the world uses. The principal tin-producing countries are Cornwall in Britain and Tasmania and other Australian provinces.

Tin Pyrites, or Sulphide of Tin, gravity 4.4, contains generally 26 per cent. of tin, 30 of copper, 12 of iron and 32 of sulphur, and as it is a copper pyrite or iron pyrite as well as a tin pyrite, the miners compromise by calling it "bell metal ore." At all events there is very little of it, it occurs in veins in the primary rock, and is as often worked for copper as for tin when it is found. Its crystalline form is cubic and very similar to iron pyrite, and it leaves a black streak on a hard white surface.

ANTIMONY.

Antimony, specific gravity 6.7, is a silver-white metal of brilliant lustre and crystalline texture. It is very brittle, and can be pulverized with a hammer. It is not sensibly affected by exposure to air at ordinary temperature, but tarnishes slowly, although it does not rust. It is only useful as an alloy, being too brittle to be used alone. It is found in the metallic state as an alloy with a great many other metals, but its principal useful occurrence is in combination with sulphur.

Sulphide of Antimony, gravity 4.5, contains 72 per cent. of antimony and 28 of sulphur. It is a leaden grey in color and of metallic lustre, unless tarnished by oxidation. It is both massive and fibrous, like bunches of needles, and can be granular. Its powder is grey, and turns black and iridescent on being heated, and will melt in a candle flame, giving off fumes of sulphur. It is found in the veins of the primaries and secondaries, intermixed with the lead and zinc ores, and with the carbonate of iron ores and sulphate of barytes, quartz and other minerals. There are oxides of antimony as well as other antimonial minerals, but they are of secondary origin and very rare occurrence, and therefore of no commercial value.

ZINC.

Zinc, specific gravity 6.8, is a brittle bluish white metal, very lustrous and of a crystalline foliaceous texture on freshly-broken surface. It is never found pure in nature, but is extracted from its ores.

Sulphide of Zinc, Black Jack, or Zinc Blende, specific gravity 4.0, contains 66 per cent. of zinc to 34 of sulphur and impurities. It is of yellowish brown color generally, but can grade down to black and bluish black. It looks like masses of agglutinated crystals of brown honey or clear resin. It occurs in all the formations between the Huronian and the carboniferous, and in some of the gold and silver mines it is a very abundant gangue rock and choice nuisance, silver ores mixed with "black jack" being the most difficult to treat. The zinc which is only worth six to ten cents per pound insists on being attended to first and acts generally as though it thought that the gold and silver were mere incidentals. Where Mother Nature has had time, however, she teaches this "black jack" to be useful by de-sulphurizing it herself, and thereby forming the carbonate and silicate of zinc.

Silicate of Zinc or Calamine, gravity 3.4, contains oxide of zinc, 71 per cent., 25 of silica and 4 of iron and lead; the oxide of zinc producing from 50 to 60 per cent. of metallic zinc when measured on the weight of the original mineral calamine. Miners call this ore and the carbonates of zinc and lead all "Dry Bone," because sometimes they look somewhat cellular, like old bone, although calamine most frequently is glassy, lustrous and transparent, and is generally colorless, but occasionally greyish to yellowish. This is one of the principal ores of zinc, is a secondary product from zinc blende, and is found most plentifully in the limestones of the Silurians. It can occur in veins or in washed deposits from broken-down veins, the debris of which has been incorporated as part of subsequent formations.

Carbonate of Zinc, or Smithsonite, gravity 4.4, is very similar to silicate, and is even yet called calamine by some engineers. It is softer than calamine and heavier, and will effervesce with acids. It contains 65 per cent. of oxide of zinc and 35 per cent. of carbonic acid and impurities; the oxide of zinc panning out about 50 per cent. of zinc, measured on the original weight of carbonate of zinc. This ore and the silicate produce nearly all the zinc used in America. They are always found together, and always where their descent from black jack can be traced with time and opportunity to devote to the problem.

Oxide of Zinc, gravity 5.5, contains 75 per cent. of zinc and 25 of oxygen and impurities. It is red or reddish yellow, brilliant lustre, and is translucent. Occurs either in grains or in foliated masses like mica, but the leaves are brittle. This ore accompanies black jack in the veins of the primary rocks as well as in the Silurians. It is the richest of all the zinc ores, and perhaps the most easily worked in the furnace, but it is not an abundant ore, and, therefore, not important as compared with the silicates or cabonates, although it is much used for making paint.

LEAD.

Lead, specific gravity 11.445, is a soft, bluish-grey metal, of high metallic lustre when freshly cut, but tarnishes almost immediately; leaves a black mark when rubbed on paper; very ductile. It is rarely or never found pure in nature, but is extracted from its ores.

Galena, or Sulphide of Lead, gravity 7.7, contains 86 per cent. Lead to 14 of sulphur; is of leaden-grey color, high metallic lustre, and nearly always is a mass of cubic crystals, which are very brittle and easily powdered into black dust. It melts and gives off sulphurous fumes when heated. It nearly alway contains more or less silver, which frequently is enough to pay for extraction; in fact, many of the great silver mines of the world are simply Galena veins, which are worked primarily for the silver, and the lead saved, after reducing the silver, is then sold as a secondary product. Galena is the mother source of all lead, the other o res being the result of reaction on the sulphide by other agents. It occurs primarily in veins, but also in beds and pockets, these being vein materials washed down or dissolved and redeposited. The veins are most frequent in the primary rocks, but they are found all the way up among the formations to the base of the carboniferous, where the veins are larger than in the primaries, but not so frequent. A feature of Galena veins is that in limestone they are largest, and diminish down through sandstones, and are smallest in the slates of the primaries. The Silurian and Devonian limestones, lying immediately on or separated from the slates by very thin members of the same groups, as in the Mississippi Valley, appear to be the best places to look for Galena veins and deposits, while the great silver-bearing lead deposits of Utah and other western localities *appear* to have very little system in their modes or locations of occurrence.

Cerussite, or Carbonate of Lead, gravity 6.5, contains 77 per cent. of lead, when pure mineral, but except as cabinet specimens it is never found pure; 60 to 65 per cent of lead is its practical yield, the balance being oxygen, carbonic acid, silica, iron, zinc, and other impurities. The pure mineral is in translucent grayish-white crystals, but the *ore* of lead is known as "dry bone," on account of its appearance. It is generally a little porous, of white or yellow or reddish-yellow color, and looks much more like masses and cakes of clay than anything else, and, unless its weight reveals its nature, it is apt to be thrown aside. It is found with galena, and is frequently the outside of a mass of which the inside is galena not yet entirely changed to Cerussite, and in such cases the mass looks like compact ashes. It does not form veins or great deposits by itself, but its presence is a good indication that galena is near, and there is sometimes enough Cerussite with the galena to pay for extraction.

Pyromorphite, or Phosphate of Lead, gravity 6.8, contains 55 per cent. of Lead, and is a green or yellow earthy-looking indeterminate crystal or mass of crystals, covering cerussite or galena as an incrustation. It is a secondary product, and is chiefly valuable as an indication that galena is to be found below, the pyromorphite generally showing at the outcrop of veins or deposits.

There are Oxides of Lead made artificially for painting purposes, and a Sulphate of Lead which effloresces over galena deposits, and there are other minor occurrences of the compounds of this mineral; but they are all secondary products of galena, and except those named, they are not even reliable indications of the proximity of lead, and are nearly indistinguishable from ordinary clays and earths.

CHROME.

Chrome, specific gravity 6.0, is a grayish white metal of radiated and crystalline texture, very hard and brittle. It is never found native, and can only be reduced from its ores with great difficulty, and is, therefore, rarely used in the metallic state, but mostly in combination with oxygen, making chromic acid, which combines with potash and other bases to make coloring matters.

Oxide of Chrome is chrome with one part of oxygen, and in this form it is translucent and crystalline, of green to yellow color, and the crystals can be large or so small as to be merely dust. This mineral combined with oxide of iron makes the chromic iron ore from which all the chromic salts used are produced. Sometimes in this ore the two oxides are simply mixed, and sometimes the Oxide of Chrome takes up the oxygen out of the iron and becomes chromic acid, when it attacks the iron and forms chromate of iron, which is the most usual form of Chrome ore. This ore again is mixed with alumina and magnesia, and occasionally silica, in which last case it is valueless, the silicious ores not yet having been economically reduced. The general appearance of chromic iron ore is that of agglomerated masses of crystals, apparently stuck together with white or yellow paste. The crystals are usually about as large as No. 1 shot, and of black or greenish black color, with a gravity of 4.5 to 5.0. The masses of crystals are very hard, but very brittle, and the amount of Oxide of Chrome obtainable is from 40 to 60 per cent. It is nearly always found with serpentine, and never outside the limits of magnesian rocks. The principal sources of supply are the Serpentines of the Atlantic States and similar formations in California.

MANGANESE.

Manganese, specific gravity 8.0, is a grayish white metal of very mild lustre, fine granular texture, rather soft and very brittle, and oxidizes very rapidly. It is very difficult to obtain pure, and unless produced by a careful and complicated chemical process it contains carbon, and then resembles cast-iron both in appearance and quality, varying principally in being more brittle and so hard as to strike fire and scratch the best steel. It enters into alloys with pretty much all the other metals, and makes them harder and whiter as well as more brittle. It is never found in the metallic state in nature.

Pyrolusite or Peroxide of Manganese, gravity 4.8, is a black to a blackish brown shining mass, sometimes velvety or fibrous in appearance, and contains 63 per cent. of Manganese to 37 of oxygen. It is found in veins in the primaries and lower secondaries, and nearly always more or less mixed with oxide of iron, making a compound ore which when combined in proper proportions, smelts into "Ferro Manganese," a very useful substance for "physicking" Bessemer and other steel. "Spiegeleisen" is one of is one of the varieties of Ferro-Manganese, these special compounds being smelted from ores either naturally or artificialy mixed. This ore of Manganese is used extensively as a producer or yielder of oxygen for all sorts of laboratory uses and for bleaching purposes. When this ore takes up water and becomes hydrated it is called Psilomelane, so long as it remains in the veins with the Pyrolusite, where it is found often in streaks through the last named.

Wad is simply Psilomelane, that has been washed out of one place and deposited elsewhere, mixed with other oxides and impurities generally, and its gravity depends on the amount of impurities; but in general it is very light, and found in loose, black, earthy masses. Wad is to the pure peroxide or pyrolusite what bog iron ore is to the purer oxides of iron.

Sparry Manganese, gravity 3.6. contains 53 per cent. of oxide of manganese, 40 per cent. of silica and 7 per cent. of iron, lime, magnesia and water. It occurs with the other manganese ores and usually in crystalline masses, flesh red in color, but can be brown to yellow and even green, and is semi-transparent generally, but sometimes opaque, and is nearly always black on long-exposed surfaces.

Although this country contains very many enormous deposits of the best peroxides of manganese, nearly all of this mineral used in the world is produced in Europe.

GEMS.

Diamond, specific gravity 3.5, is pure carbon. It is the hardest substance known, and also the most valuable in man's estimation, on account of its great rarity and sur-

passing beauty. Diamonds are of many colors, but the most valuable are colorless, perfectly transparent and limpid, and of adamantine lustre. From this they graduate in colors to white, yellow, red, blue, green, brown and black, their value being as variable as their color. The black diamonds are now becoming very valuable as cutters in drilling tools, and as diamond dust in the cutting of precious and tabular stones. Diamonds are found in gravel and sand beds, principally among the gold washings, although they may be just as plentiful (or rather scarce) in other sands and gravels as those of the gold regions, and still not be so frequently discovered, because these other sands are not so frequently examined, and the diamonds resemble ordinary pebbles so much that whole fortunes may be cast aside unconsciously. In washing gravels for diamonds, the operation should not be a rough, rapid one, as the mechanical portion of the operation consists in washing off the silicious pebbles with a gravity of 2.5. from the diamonds with a gravity of 3.5, so that there is not much difference in weight *under water* to operate on. The crystal of the diamond is octohedral. and looks like a couple of flattened "four-square" pyramids stuck together—base to base. The faces or planes of the crystals are not concave or hollow, but very slightly convex or full, and the edges or corners are remarkable for being not sharp, but slightly rounded, although they will cut glass or rock crystal easily enough. The diamond has a peculiarly cold "feel" to it, and in the rough state very often looks like a lump of gum arabic. Do not try to test a stone for diamond by striking it, as diamond will smash nearly as readily as other crystals, notwithstanding the contrary opinion of many people who do not know the difference between hardness and toughness. A diamond will stand great pressure, however, and will allow itself to be slowly pressed into the side of the blade of a knife, or it will smooth down the teeth of a file in short order. The value of diamonds is entirely a matter of size, clearness, freedom from flaws, and color. The value increases with the size in a most astounding ratio, but, big or little, pure or impure, colorless or black, they are always more or less valuable. In addition to the sands and gravels as places to look for diamonds, they are also found in South Africa in what appear to be cavities (having superficial areas of several acres, and depths of several hundred feet) in ledges of shale rock of undetermined geological age, these cavities being filled with grayish clayey soil which is dug out and weathered until it breaks up fine, and is then washed in pans and sluices, the diamonds being left behind, as with gold washing.

Jet, specific gravity 1.25, is simply asphalt, and is found in the lignite beds of the tertiary formation. It is "jet" black, perfectly opaque, texture compact and homogeneous generally, although it sometimes shows a woody fibre; it occurs in irregular masses of a few ounces to a few pounds weight, and these masses sometimes have the shape of knotty branches of trees. Its lustre is shining and brilliant, its fracture conchoidal, and it is as clean as anthracite, and hard. It is used for all sorts of "mourning" jewelry and trinkets, and has many imitations. It is to be looked for in the lignitic coal beds everywhere.

Amber is also an asphaltic mineral, but is generally of a wine-yellow color, transparent and beautifully lustrous, although inferior varieties may be somewhat dull and cloudy, and even brown or black in color. Amber is found in the lignite beds in the same position as jet, but the pieces are generally much smaller than the pieces of jet, and it is much scarcer and more valuable. About the only mining that is done exclusively for amber is near the sea-shore in Germany, where, at a depth of many feet below sea level, there is found a lignitic bed containing many pieces of amber, and very extensive and costly operations are now carried on to obtain it. The choice pieces contain insects which were embedded in the amber when it was exposed and liquid, and have been preserved ever since. Amber has many imitations, principally gums or resins such as gum copal.

Sapphire, specific gravity 4.0, when absolutely pure, is simply pure alumina, but it generally contains traces of lime and iron. Although blue is the true sapphire color, yet the red is the most valuable. The red sapphire is called the oriental Ruby; the yellow, the oriental Topaz; the green, the oriental Emerald; and when it is violet colored, it is the oriental Amethyst. The sapphires rank next to the diamonds in value, and the ruby or red sapphire, when especially perfect, is fully equal to diamond. Sapphires are rather longish hexagonal prisms, just about the shape of one of the cells in a honey-comb, but the very perfect crystals are rarely that large, especially the rubies. Sometimes the crystals will be six sides at the base and taper towards the other end, or even run out to a point, making a six-sided pyramid, and occasionally two of these pyramids will be joined together, base to base. The sapphires are simply corundum

(used in polishing) and are next to diamonds in hardness. They will cut anything except each other and diamond, but they will not stand smashing any better than diamond. They are found in veins carrying chloritic minerals along with corundum and emery in serpentine and other dykes in the primary rocks, and are also washed out of clays, sands, etc., which have resulted from the destruction of the original veins, just as gold is found; and their great weight assists in their detection.

Ruby, or Spinel Ruby, gravity 3.5, contains 85 per cent. alumina, 8 of magnesia and 7 of chromic acid, which last constituent gives it its red color, which is scarlet, or rose red, or orange red, or violet red. The crystal is octohedral, looking much like a couple of four, square pyramids fastened base to base, similar to diamond crystals. Spinel rubies are not so hard nor so valuable as the sapphire rubies, and are found in very much the same localities, but with an additional range up into the crystalline and other lower limestones. This ruby is as heavy as the diamond, but not as heavy as sapphire.

Chrysoberyl, gravity 3.8, contains 72 per cent. of alumina, 18 of glucina, 6 of silica, and 4 of iron and other things. Its crystal is generally a short six-sided prism, but occasionally is very complicated. Its color is green, with a yellowish or brownish tinge, and it has the gem-like reflection of light from the interior. It accompanies the sapphires and other aluminous gems, but is not ranked very high in value.

Turquoise, gravity 3.0, contains 45 per cent. of alumina, 30 of phosphoric acid, 4 of copper, 2 of iron, and 19 of water. It is bluish green and somewhat waxy or dull lustre, passing into sky blue or apple-green. It is opaque, and the crystals are generally decomposed into kaolin on the outside and difficult to recognize. It is found with the other aluminous minerals.

Tourmaline, gravity 3.0, is of many colors, and some variation in constitution, the red showing 44 per cent. of alumina, 40 of silica, 4 of boracic acid, 5 of manganese, and 7 of lithia and water. The red tourmaline called rubellite has all the color and richness of the ruby, and is found much larger, affording gems of great beauty and value. Yellow tourmalines are often as fine and almost as valuable as the topaz. There are black and blue tourmalines which are also more or less valuable, and the long slender crystals of black tourmaline are much sought after for cabinets. Tourmalines are crystallized in prisms of 3 or 6 or more sides, but the number of sides is always a multiple of 3. They are very brittle, and are found in the primary rocks and the lower limestones of the secondaries, also in, or around veins or dykes.

Topaz, gravity 3.5, contains 57 per cent. of alumina, 34 of silica, 9 of fluoric acid. Its color is usually a wine yellow, but it runs into green, red, and blue shades. Its crystal is an eight-sided prism, and its color can be easily altered by the application of heat. Its place is in veins, dykes, etc., along with the other aluminous minerals, and its value is not of the first rank, the red crystals being the most prized, as they can be passed off as rubies.

Emerald, gravity 2.7, contains 66 per cent. of silica, 17 of alumina, 15 of glucina, and 2 per cent. of chromic iron. It is of a rich green color, somewhat vitreous lustre, comes in six-sided prisms, and is found in the primary and secondary rocks, principally in magnesian limestones. Perfect emeralds are very scarce, beautiful and valuable. They are hard and brittle, and dull coated on the outside, and therefore difficult to recognize.

Beryl, gravity 2.7, contains 66 per cent. silica, 17 of alumina, 15 of glucina, and 2 of iron oxide, thus differing only in the matter of a little chrome from the emerald, but differing greatly from the chrysoberyl, which is decidedly aluminous, while Beryl is just as decidedly silicious. Beryl comes in six-sided prisms, very much like emerald, and is found in the same rocks. They are greenish in color, and the very clear, pure sea-green crystals are called aqua-marines, and are very valuable.

Opal, gravity 2.1, contains 90 per cent. of silica and 10 of water. This stone is simply a soft quartz, but its perfect specimens are in the same rank as diamonds and rubies for beauty and value. It is white, red, yellow, green, or gray in color, very compact and lustrous, and presents a somewhat milky appearance. It is remarkable for its power of reflecting all the colors of the rainbow from a single ray of light as the stone is turned over. When this play of colors is perfect, the stone is a "precious" opal, when only the red or yellow rays are reflected it is called "Fire" Opal, and when it ceases to give off colored light it becomes common or semi-opal, and even becomes brown or black, in color. Opal is a quartz pebble, and is to be looked for anywhere that quartz is found, even up in the tertiaries or quartenaries.

Amethyst, gravity 2.6, is quartz pure and simple. It is in six-sided crystals with a vitreous lustre. A six-sided prism with a six-sided pyramid on one end, the other end attached to a matrix of sandstone, is the most usual form. The color of the true amethyst is violet, but the red stone, properly called "rose quartz," is often called red amethyst; the yellow quartz or false topaz also is erroneously called yellow amethyst.

A lot of quartz crystals taken from one "digging" will often show amethyst, rose quartz, yellow quartz, smoky quartz and prase or green quartz, and they are all very beautiful stones, much valued.

Carnelian, gravity 2.6, is also quartz, but it is in the chalcedonic state, *i. e.* massive, translucent (not transparent), and somewhat waxy look about it. Carnelian is bright red, and of a rich clear texture and tint, and is much used by the jewellers.

Chrysoprase is an apple green quartz of the chalcedonic variety.

Agate is a variegated chalcedonic quartz, the colors being arrayed in concentric rings or distributed in cloudy-looking spots. Sometimes they are in zig-zag lines and again resemble a bunch of loose hair or moss floating in water.

Onyx, gravity 2.6, is simply agate laid out flat instead of in circles. The layers of different colored quartz in the onyx are laid on each other like the leaves of a book, It is used principally in mosaic work, where by cutting away portions of the upper layer of one color, the next layer of an entirely different color is exposed. A new article of onyx, which is not onyx, has been introduced into American art under the name of the "Mexican" Onyx. It is a very beautiful stone, and the paper weights, vases, cabinet specimens, mantels and brackets from it are of rare beauty and very valuable; but it is carbonate of lime, and, therefore, not onyx, which is silica.

Garnet, gravity 4.0, contains 42 per cent. silica, 20 of alumina, 33 of iron, and 5 of manganese. Sometimes the manganese is increased at the expense of the other constituents, principally the silica and iron. The general shape of the crystal is spherical, but its surface is made up of great number of small facets. There are very many colors to this stone, but the precious garnet is a clear, deep red, and is quite valuable. Other varieties are the "Cinnamon" stone, of a light, yellowish brown color, or the Ouvarovite, which contains chrome and is of a rich emerald green color, and there are also brown, yellow and black garnets. Garnet is very hard but also quite brittle, and the coarser varieties are crushed into sand and used as an abrasive. The garnets belong in the primary formations, and are genenerally found studding the slates and elsewhere in rather solid rock, but rarely in recent alluvial deposits.

Lapis-Lazuli, gravity 2.7, contains 45 per cent. silica, 32 of alumina, 9 of soda, 4 of lime and 10 of iron, sulphur, chlorine and water. It occurs in many-faced spherical crystals, and also in slabs, and its color is the richest of rich azure blue. Its powder is the celebrated paint known as "Ultra-Marine," and the stone itself is used for jewelry of all kinds and for mosaic and inlaid ornamental carvings. Fine slabs of this mineral are very valuable, and it is to be looked for in granite and other primary rocks, and in the lower limestones.

Hyacinth, gravity 4.6, contains 33 per cent, of silica and 67 of zirconia. Its color is red, and it is beautifully clear and of adamantine lustre. It comes in square prisms, sometimes with the corners beveled off, and perfect specimens are very valuable. Hyacinths are the purer varieties of the mineral Zircon, which is brown, grey, yellow or white, and is used for watch jewels. The zircons, including of course the hyacinths, are found only in the primary rocks.

Precious Serpentine, gravity 2.5, contains 42 per cent. silica, 44 of magnesia, 12 of water and 2 of iron, etc. The more beautiful portions of the rock serpentine are called "precious." It is usually massive and compact in texture, and of an oily green color, dull resinous lustre, and soft enough to be cut with a knife. Its colors are very rich, and it is very highly prized as a material for vases, mantels, brackets, and other ornamental work. It occurs in dykes thrown up through the primary rocks, and can be quarried out in blocks and slabs with care.

Verd Antique is a marble limestone having serpentine disseminated through it in veins or cloud-like masses, and is one of the most valuable of ornamental stones.

Malachite is the green carbonate of copper. When found in large and pure enough masses to be cut into vases, table-tops, etc., it is too valuable to waste in making copper. Its value depends largely on the color bands and radiations.

PAINTS.

Natural paints are those minerals which, when finely powdered and mixed with oil, will adhere to any surface upon which they may be spread, and in time form a skin or film hard and impermeable enough to protect the surface from ordinary weathering.

Red Iron Paint is composed of oil mixed with the red powder of pulverized sesqui-oxide of iron, the ores for this purpose being the grey or red oxide, *i. e.*, the specular and red hematites described under the head of iron and its ores. The sesqui-oxide of iron contains 70 per cent. of iron and 30 of oxygen, and is the richest possible *red* iron paint, for the reason that no iron oxide becomes red until it takes up 30 per cent. of oxygen, notwithstanding the efforts of certain paint makers who guarantee their red paint to contain 72 and even 90 per cent. metallic iron. The red paint made by complete pulverizing of the grey sesqui-oxide, or the red dyestone hematite ores, with very heavy machinery and conscientious care, is a first-class paint, and possesses merit enough of its own, without any 90 per cent. guarantee, or sailing under false colors.

Yellow Iron Paint is the powder of pulverized hydrated sesqui-oxide of iron, commonly called limonite or brown hematite iron ore. When pure, this ore cannot contain more than 60 per cent. of iron, but by mixing with the anhydrous oxides, the color is darkened and the metallic percentage increased nearly up to that of the red or black oxide.

Black Iron Paint is the powder of pulverized black oxide of iron, this being the magnetic ore, and contains, when pure, 72 per cent. of iron. This ore is a proto-sesqui-oxide, and is the richest possible stable or fixed compound of iron and oxygen, the proto-oxide changing into this by taking up more oxygen on the first exposure to moist air. This black powder mixed with the red or yellow powders, gives a very wide range of colors, and all in first-class metallic oxides.

Umber is of variable shades, but is produced by mixing the iron paints with powdered oxide of manganese, which gives a purplish gloss to the iron colors.

Red Copper Paint is the pulverized red oxide of copper, and is rarely made for use out doors, as the ore is too valuable.

Green Copper Paint is the pulverized green silicate of copper, and is a fancy color.

Zinc White is the oxide of zinc, and is not found pure enough in nature, so that it has to be manufactured with great secresy, at large and costly establishments.

White Lead is carbonate of lead, which also is made in large establishments, and under complicated processes, the native carbonate ores of lead not being pure enough.

Red Lead is an oxide of lead, and has to be carefully manufactured by experts.

Vermillion is pulverized cinnabar, the sulphide of mercury.

Spar Paint is pulverized barytes. It makes a tolerable paint, very white in color, and is the best thing to mix with white lead or zinc paints, if you will have adulterations.

Cement Paint is any kind of lime mixed with vegetable oil instead of water, as in the case of whitewash. There are some of the cements which make a most admirable paint when ground in oil.

Slate Paint is simply selected scraps of fine grained slates pulverized and mixed or ground in oil. When used in very thick coats the slate paints become fire-proof, and mixed with india rubber, or sometimes asphaltic mineral, they make good roofing.

Graphite Paint is pulverized pure black lead or graphite. This is very fine and glossy, and can be made into a fire-proof coating for roofs and other surfaces.

Red Ochre is fine clay containing enough red iron ore to tint it. It can be made artificially by mixing red iron paint with clay, but the fine natural ochres are the most valuable, by reason of the immense amount of assortment and trituration which they have undergone, and which man has not yet successfully imitated, except by expensive chemical precipitation. It is possible that a mixture of iron paint and hydraulic cement or lime might prove very valuable.

Yellow Ochre is any mixture of clay with brown iron ore, and can be prepared artificially, as with red ochre, but the natural mixture is the best. These ochres when mixed with manganese make the different shades of umber. The difference between the metallic paints and the ochraceous paints is merely that the metallic paints are the pure oxides, while the ochres have more or less clays mixed with them. All natural paints should be carefully assorted into lumps of uniform color and texture before being powdered, or the result will be variable. The yellow iron paints and ochres change to red by burning, *i. e.*, the water of hydration is burned out of the limonite iron ore, leaving it a red hematite.

PROFESSOR J. D. DANA'S TABLE OF GEOLOGICAL FORMATIONS.

SYSTEMS OR AGES.		GROUPS OR PERIODS	FORMATIONS OR EPOCHS.
Age of man.		20. Quaternary.	20. Quaternary.
Age of mammals.		19. Tertiary.	19 c. Pliocene. 19 b. Miocene. 19 a. Eocene.
Reptilian age.		18. Cretaceous.	18 c. Upper Cretaceous. 18 b. Middle Cretaceous. 18 a. Lower Cretaceous.
		17. Jurassic.	17. Jurassic.
		16. Triassic.	16. Triassic.
Carboniferous.		15. Permian.	15. Permian.
		14. Carboniferous.	14 c. Upper Coal Measures. 14 b. Lower Coal Measures. 14 a. Millstone Grit.
		13. Subcarboniferous.	13 b. Upper Subcarboniferous. 13 a. Lower Subcarboniferous.
Devonian, or age of fishes.		12. Catskill.	12. Catskill.
		11. Chemung.	11 b. Chemung. 11 a. Portage.
		10. Hamilton.	10 c. Genesee. 10 b. Hamilton. 10 a. Marcellus.
		9. Corniferous.	9 c. Corniferous. 9 b. Schoharie. 9 a. Cauda Galli.
SILURIAN OR AGE OF INVERTEBRATES.	Upper Silurian.	8. Oriskany.	8. Oriskany.
		7. Lower Helderberg.	7. Lower Helderberg.
		6. Salina.	6. Salina.
		5. Niagara.	5 c. Niagara. 5 b. Clinton. 5 a. Medina.
	Lower Silurian.	4. Trenton.	4 c. Cincinnati. 4 b. Utica. 4 a. Trenton.
		3. Canadian.	3 c. Chazy. 3 b. Quebec. 3 a. Calciferous.
		2. Primordial or Cambrian.	2 b. Potsdam. 2 a. Acadian.
		1. Archæan.	1 b. Huronian. 1 a. Laurentian.

PROFESSOR T. STERRY HUNT'S TABLE OF GEOLOGICAL FORMATIONS.

AGES.	GROUPS.	AMERICAN FORMATIONS.
Cenozoic.	20. Quaternary.	20. Recent.
	19. Tertiary.	19 c. Pliocene. 19 b. Miocene. 19 a. Eocene.
Mesozoic.	18. Cretaceous. 17. Jurassic. 16. Triassic.	18. Cretaceous. 17. New Red Sandstone. 16. New Red Sandstone.
Paleozoic.	13–15. Carboniferous.	15. Permo-Carboniferous. 14. Coal Measures. 13 b. Mississippi (Carb. Limestone). 13 a. Waverley or Bonaventure.
	8–12. Erian or Devonian.	12. Catskill. 11. Chemung and Portage. 10. Hamilton (including Genesee and Marcellus). 9. Corniferous or Upper Helderberg. 8. Oriskany.
	5–7. Silurian.	7. Lower Helderberg. 6. Onondaga or Salina. 5 c. Niagara (including Guelph). 5 b. Clinton. 5 a. Medina. 5 a. Oneida.
	4. Upper Cambrian, Siluro-Cambrian, Ordovician, or Ordovian.	4 c. Loraine. 4 b. Utica. 4 a. Trenton.
	3. Middle Cambrian.	3 c. Chazy. 3 b. Levis (Tremadoc and Arenig). 3 a. Calciferous.
	2. Lower Cambrian.	2 e. Potsdam. 2 d. Sillery. 2 c. Acadian (Menevian). 2 b. Taconian. 2 a. Keweenian.
Eozoic.	1. Primary or Crystalline.	1 e. Montalban. 1 d. Norian or Labrador.* 1 c. Huronian. 1 b. Arvonian. 1 a. Laurentian.

* Professor Hunt says there are many reasons for believing that the Norian may be older than the Arvonian and Huronian.

NOTES.—In the following notes Professor Hunt's classification is sufficiently followed to show the nature of the older groups which he distinguishes :

1 a. *Laurentian.* Chiefly massive gneiss, reddish or grayish, sparingly micaceous, often hornblendic. Some crystalline limestone, magnetic iron, and other metallic ores.

1 b. *Arvonian.* Chiefly petrosilex, often becoming quartziferous prophyry, with some quartzites and hornblendic rocks ; magnetic and specular iron ores.

1 c. *Norian.* Chiefly a feldspathic rock (norite), which sometimes carries garnet, epidote, etc. ; also, great beds of titaniferous iron ores.

1 d. *Huronian.* Chloritic schists, greenstone (diorite or diabase), serpentine, steatite, dolomite, copper, chrome, nickel, and iron ore.

1 e. *Montalban.* Fine-grained micaceous or hornblendic gneiss, chrysolite rock, serpentine, mica-schist, granite.

2 a. *Keweenian.* The copper-bearing series of Lake Superior, made up of sandstones and conglomerates, with much interstratified eruptive rock.

2 b. *Taconian.* Granular quartzites, argillites and nacreous or hydro-micaceous schists, and great masses of crystalline limestone, marbles, magnetite, siderite, and pyrite changing to limonite.

2 c and 2 d. *Acadian* (and *Sillery*). Fossiliferous sandstone and shale.
2 e. *Potsdam.* Sandstone, conglomerate.
3 a. *Calciferous.* Sandy magnesian limestone, calcareous sandstone.
3 b. *Quebec.* Sandstone, limestone conglomerate, black slate.
3 c. *Chazy.* Limestone, chert.
4 a. *Trenton.* Limestone, buff and blue; dolomite carrying lead-ore deposits; brown hematite beds.
4 b. *Utica.* Dark carbonaceous slate; impure limestone.
4 c. *Hudson River.* Slate, shale, clay, grit.
5 a. *Medina.* Conglomerate; argillaceous sandstone.
5 b. *Clinton.* Sandstone, shale, conglomerate, limestone, fossiliferous red hematite, or oolitic iron-ore bed.
5 c. *Niagara.* Clay shale; limestone.
6. *Salina.* Red shale, gypseous shale, hydraulic lime, salt.
7. *Lower Helderberg.* Limestone, shaly or compact, and fossiliferous.
8. *Oriskany.* Sandstone.
9. *Corniferous or Upper Helderberg.* Principally limestone.
9 a. *Cauda-galli.* Fine-grained calcareous and argillaceous, drab or brownish sandstone; peculiar fossils.
9 b. *Schoharie Grit.* Fine-grained calcareous grit, similar to 9 a, but with differing fossils.
9 c. *Onondaga*, and 9 d. *Corniferous.* Gray, blue, black limestone. At the top of 9 d occur the Marcellus iron ores (carbonate).
10 a. *Marcellus.* Black or dark brown bituminous and pyritiferous shales. In 10 a and 9 d occur the petroleum deposits of Canada.
10 b. *Hamilton.* Slate, shale, sandstone, calcareous, and argillaceous.
10 b. *Tully.* Impure dark limestone.
10 c. *Genesee.* Black clay slate.
11 a. *Portage.* Green and black sandy and slaty shales, sandstone, flagstone.
11 b. *Chemung.* Thin-bedded greenish sandstones and flagstones, with intervening shales, and rarely beds of impure limestone.
12. *Catskill.* Red, gray sandstone, grindstone grit, greenish shale, conglomerate.
13 a. *Lower Subcarboniferous.* Sandstone, limestone, small local coal beds.
13 b. *Upper Subcarboniferous.* Red shale, red and gray sandstone, blue limestone.
14 a. *Millstone Grit.* White or yellow sandstone, and conglomerate of quartz pebbles.
14 b and 14 c. *Coal Measures.* Fire-clay, shale, sandstone, conglomerate, limestone, bituminous coal, anthracite, iron ore, salt.
15. *Permian.* Limestone, sandstone, marl, shale.
16. *Triassic.* Red sandstone, red shale, conglomerate, lignite, trap dikes, copper ore, coal.
17. *Jurassic.* Marl, limestone, probably the gold-bearing slates of California.
18. *Cretaceous.* Earthy beds of sand, marl, clay, limestone, chalk, lignite.
19. *Tertiary.* Earthy sand, clay, marl, limestone, sandstone.
20. *Quaternary.* Sand, pebbles, boulders, clay, diluvium, alluvium; gravel and placer tin and gold deposits.

NOTE.—The primary and crystalline schistose rocks contain the larger number of mineral veins. The ancient magnesian limestones (probably Devonian) are characterized in many localities by deposits of argentiferous lead ore and of zinc ore.

PROSPECTOR'S OUTFIT.

No fine clothes, not even a white shirt, should be brought to the mountains. The prospector should have two ponies or two jacks, a pole pick, shovel, compass, frying-pan, tin plate, knife, fork, spoon, four double blankets, oil cloth, gum overcoat and leggings, and a small tent.

PROF. CLAYTON'S ADVICE.

1. Examine the gravel and boulders of the mountain streams, and note carefully the structure and character of the gravel wash. This will reveal the geological formations that are intersected by the stream. Try the sands at the head of the gravel bars for free gold, or for any crystalized minerals. If the structure of the quartz boulders or other vein stones is favorable, go up the stream until the geological zone is found that has produced the quartz or other metal-bearing minerals. Then follow the supposed metal-bearing zone on its line of strike, and make especially careful examinations wherever eruptive dykes are found intersecting the formation.

2. When a lode or vein is found, note carefully its relation to the country rock, especially any differences in the opposite walls of the vein. Then follow it on the line of outcrop, and note carefully those points where the best ores are seen, so as to determine the position of the best ore chutes before making any location on the lode.

3. The first work should consist of shallow cuts across the lode at intervals of 50 to 100 feet, or if the vein is small and partially covered by soil and debris, a trench along the line of outcrop is preferable. If the surface tracing is satisfactory, and the true line of strike has been determined, then survey your claim and stake off the boundaries according to the requirements of the United States laws.

4. The work of exploring the vein under ground is the next thing in order. To do this intelligently you must select that point on the line of outcrop where the best ore is found, then sink a shaft on the lode following the angle of dip, keeping both foot wall and hanging wall exposed if possible. If the lode is too wide for this to be done, then follow the best ore streak of the vein itself, and at every fifty feet in depth make cross-cuts to the walls of the vein.

5. After 100 feet deep has been reached, run levels each way from the shaft on the line of the vein, in order to determine the extent or spread of the ore chute or chimney on the horizontal line. When the limit of the ore body on the horizontal line has been ascertained, then sink 100 feet more, and drift right and left as before. If more than one chimney of ore is found on the line of the vein, a shaft should be sunk on it, and drifts run as above stated, being careful to confine all the exploring work within the walls of the vein itself.

6. When enough has been done to prove the character, size and quality of the vein, it will then be time to determine the position, character and extent of the "dead-work" necessary to work the mine to the deep. These questions should be settled by careful surveys made in the light of all the local facts and surroundings, such as the geological structure of the country rock, the probable amount of water to be raised, the lowest point of drainage by adit or level, and the most convenient point for delivery of the ores to the surface, etc.

The last part of the preliminary exploration of any mine is to determine, by actual tests, what are the best methods of reduction, and the extent and kind of reduction works needed, etc.

7. After all these preliminary facts have been thoroughly ascertained and clearly defined, the unavoidable risks of mining will have been fully met and overcome. All subsequent operations are simply matters of skill and business management, and the capitalizing of the mine becomes a mere matter of business detail.

The requirements are as follows:

1. The preliminary exploration must have ore enough cut and under-run, or otherwise exposed, to give at least two years' work for reduction work of an extent sufficient for the annual average output of ore.

2. The reduction works must be suited for the best treatment of the ore.

3. The exploration of the mine must be pushed ahead of the extraction of ore, so as to expose at least one ton of ore in new ground for every ton extracted from the previously explored ground.

4. Before erecting reduction works, the ore exposed in the mine should be so thoroughly tested as to guarantee a net profit sufficient to pay the whole cost of such work.

5. The mine being well opened, and the reduction works or plant established, the general success of the enterprise must depend upon the efficiency of the general business management.

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Is Your Title Defective?

Do not rest secure until patent issues for your land. 500,000 patents await delivery. A Receiver's receipt does not convey legal title. It is only good against no better title. Do not buy of private parties, land in the public land States and Territories, unless a patent can be shown. Errors frequently occur in making out entry papers. The land you think yours may be sold to some one else who will take your improvements or make you pay dearly.

To avoid delay and bother in getting evidence, your entry papers should be examined by a skillful person as soon as they reach the General Land Office. $5.00 will cover this examination. If your entry papers get into the defective files, it will probably be years before a patent can issue.

Parties who believe they have an interest in any old land claim can have the matter investigated.

Have you a Bounty Land Warrant, or a Soldier's Homestead Certificate, or any other land scrip or warrant you wish to sell? Do you wish to buy warrants or scrip for a particular purpose? A fair interest will be given any person who can learn of a specially good opportunity for locating scrip or warrants on townsite or other lands, or on mineral lands where the mining laws do not apply.

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